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2000

EPA Superfund
Record of Decision:

RHINEHART TIRE FIRE DUMP
EPA ID: VAD980831796
OU 03
FREDERICK COUNTY, VA
09/29/2000

Record of Decision
Operable Unit 3

Rhinehart Tire Fire Superfund Site
Winchester, Virginia

DECLARATION

A. Site Name and Location

The Rhinehart Tire Fire Superfund Site (Site) is located in a sparsely populated rural area in western Frederick County, Virginia, approximately six miles west of Winchester and approximately 65 miles west-northwest of Washington, D.C. This Record of Decision (ROD) addresses Operable Unit 3 (OU3) of the Site.

B. Statement of Basis and Purpose

This decision document presents the Selected Remedy for OU3 of the Rhinehart Tire Fire Site (the Site), in Winchester, Virginia, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for the Site. This decision is based on the Administrative Record File for OU3 of the Site.

The Virginia Department of Environmental Quality concurs with the Selected Remedy.

C. Assessment of the Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

D. Description of the Site

This remedy constitutes the third and final operable unit for cleaning up the Site. An emergency removal action and Operable Units 1 and 2 (OU1 and OU2) addressed the immediate threats posed at the Site. All work associated with the emergency removal action and the response actions selected in the OU1 and OU2 RODs as well as the Explanation of Significant Differences (ESDs) for both the OU1 and OU2 RODs is complete.

The selected remedy for OU3 includes the following major components:

1. Removal of all of the sediments from Rhinehart's Pond and the sediment which exceeds 1,600 mg/kg of zinc in Massey Run. The sediments will be disposed of in a Subtitle D landfill, based on the results of recent sediment sampling. The surface water in Rhinehart's Pond will be treated prior to discharge.

2. Decommission the following facilities, which were installed as part of the previous cleanup actions:

   - Conduct an evaluation during the remedial design to determine whether to remove the shotcrete from the face of the slopes or leave it in place; if removed, the shotcrete will either be disposed of off-Site or used as fill on the Site.
   - Abandon the existing subsurface drainage system in accordance with generally accepted engineering practices.
   - Abandon the existing monitoring wells installed for the Remedial Investigation in accordance with generally accepted practices.
   - Remove and properly dispose of the oil/water separator, water treatment plant and the Site fencing.
   - Remove the dam on Rhinehart's Pond. The material from the dam will be used as backfill only if it does not exceed the Risk Based Concentrations (RBCs) or local background levels, whichever one is greater; the concrete portions of the dam may also be backfilled on-Site.[1]
   - Re-grade and re-vegetate the face of the slopes and the benches; the pile of fill material which is presently staged on the property will be used as backfill on the Site only if it does not exceed the RBCs or local background levels, whichever one is greater.
   - Re-grade and re-vegetate the remaining portions of the Site.
   - Re-channel the stream where Rhinehart's Pond was.

E. Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the

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[1] EPA may decide to leave the dam intact if, by the completion of remedial design, Frederick County or some other entity obtains possession of the dam and of the land on which the dam and pond are located and agrees to maintain the dam and pond. If EPA decides to revise the remedy to leave the dam intact, this decision would be implemented in accordance with the procedures contained in the NCP.

remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. The remedy for this operable unit does not satisfy the statutory preference for treatment as a principal element of the remedy because sampling results show that the sediments are not classified as hazardous and can be disposed of in a Subtitle D landfill without treatment. Because this remedy will not result in hazardous substances, pollutants, or contaminants remaining on-Site above levels that allow for unlimited use and unrestricted exposure, a five-year review will not be required for this remedial action.

F. ROD Data Certification Checklist

The following information is included in the Decision Summary of the Record of Decision. Additional information can be found in the Administrative Record File for this Site.

- Chemicals of concern and their respective concentrations.
- Cleanup levels established for chemicals of concern and the basis for these levels.
- Current and reasonable anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and ROD.
- Potential land and ground water use that will be available at the Site as a result of the Selected Remedy.
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.
- Key factors that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision).

The baseline risks are not listed because all of the human health risks, except for the ingestion of possibly contaminated fish, are attributed to natural background levels. Information on how source materials constituting principal threats are addressed is not discussed in the Decision Summary because there are no principal threat wastes remaining at the Site.

G. Authorizing Signature

Abraham Ferdas, Director
Hazardous Site Cleanup Division
Region III

9/29/00
Date

RECORD OF DECISION

RHINEHART TIRE FIRE
OPERABLE UNIT 3

DECISION SUMMARY

A. Site Name, Location, and Description

The Rhinehart Tire Fire Site (the Site) is located in a sparsely populated rural area in western Frederick County, Virginia, approximately six miles west of Winchester (Figure 1). The Site is approximately 65 miles west-northwest of Washington, D.C.

EPA is the lead agency and the Virginia Department of Environmental Quality is the support agency for the Site. The Superfund Trust fund monies are being utilized in investigating, managing, and cleaning up the Site.

Figure 2 shows the layout of the Site. The Site covers approximately five acres and consists mainly of a ravine that was used as a tire-disposal facility, a pond, a partially constructed incinerator, a treatment facility, and several drainage features.

As a result of excavation and regrading activities, the Site consists of three relatively flat areas (i.e., benches) separated by steep slopes. The sloped portion of the benches is covered with shotcrete, a hard material used to prevent erosion. The flat portion of the benches was graded and covered with clean fill material and is now covered with grass.

Surface drainage from the Site discharges into Rhinehart’s Pond. The present water flow path at the Site is shown on Figure 3. The operator created Rhinehart’s Pond prior to the fire by damming Massey Run, apparently for use as a cooling water pond. The water from Rhinehart’s Pond is treated in the on-site treatment facility prior to discharging into Massey Run. Massey Run is a shallow, intermittent stream that discharges into Hogue Creek approximately 3/4 of a mile downstream. Hogue Creek is a tributary of the Potomac River.

B. Site History and Enforcement Activities

Between 1972 and 1983, the operator used the Site as a tire storage area, transporting discarded tires from area landfills, which could no longer accept tires for disposal. During the course of his business, it is estimated that as many as twenty-five million tires were handled by the operator. Most of the tires were sold for re-tread and others for dock linings, etc. The remainder of the tires, those that were in too poor shape for commercial use, were stored in a natural drainage swale of the wooded slope behind his home. On October 31, 1983, a fire broke out in the tire-storage area. The fire spread and engulfed between 5 and 7 million tires that were stored at the

Site. The fire was brought under control within a few days, but continued to smolder for six months. The fire generated black smoke that was visible for approximately twenty miles. An investigation revealed that the fire was caused by an arsonist.

The burning of the tires caused the release of inorganics contained in tires. The melting and pyrolysis of the tires produced a hot oily substance that began to seep from the storage area into Massey Run. An EPA Emergency Response Team (ERT) initially constructed a catch basin to trap the oil. However, because of a higher than estimated flow rate, the oil and water seepage threatened to exceed the capacity of the catch basin. Therefore, ERT constructed a second pond down-slope from the burn area. This pond, a lined, 50,000-gallon pond since named Dutchman's Pond, was constructed by mid-November 1983. Approximately 800,000 gallons of oil product were collected in Dutchman's Pond. The oil subsequently was removed from the Site and recycled into fuel oil.

In 1983, EPA entered into an administrative order by consent with the operator of the Site. The Site operator subsequently constructed dikes and ditches to control drainage and performed collection and pumping operations to minimize the volume of waste seeping from the Site. In addition, the operator trenched and graded the Site, which has affected the flow of shallow ground water and the distribution of the ash residue that remained after the fire.

The Site was placed on the Superfund National Priorities List (NPL) in 1986 to address the long-term cleanup of the Site. EPA is utilizing the Superfund Trust funds to finance the investigations and cleanup of the Site.

Scrap metal, the tires which were not burned during the fire, and additional tires which the operator received since the fire are being removed under the jurisdiction of the Virginia Solid Waste Program.

C. <u>Community Participation</u>

The Remedial Investigation/Feasibility Study (RI/FS), Technical Memorandum Numbers 1 and 2, and the Proposed Plan for Operable Unit 3 of the Rhinehart Tire Fire Site in Frederick County, Virginia were made available to the public on August 25, 2000 in accordance with the requirements of Sections 113(k), 117(a), and 121(f) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. §§ 9613(k), 9617(a), and 9621(f). They can be found in the Administrative Record file and the information repository maintained at the EPA Docket Room in Region 3 and at the Handley Library. The notice of availability of these documents was published in the <u>Northern Virginia Daily</u> and the <u>Winchester Star</u> on August 25, 2000.

A public comment period was held from August 25, 2000 to September 24, 2000. In addition, a public meeting was held by EPA and the Virginia Department of Environmental Quality (VDEQ) on September 12, 2000, in accordance with Section 117(a)(2) of CERCLA, 42 U.S.C. §

9617(a)(2). At this meeting, representatives from EPA presented the findings on the contamination at the Site and the remedial alternatives under consideration. EPA also used this meeting to solicit community input on the reasonably anticipated future land use and potential beneficial ground water uses at the Site. EPA’s responses to the comments received during this period are included in the Responsiveness Summary, which is part of this Record of Decision. This decision document presents the selected remedial action for Operable Unit 3 of the Rhinehart Tire Fire Site in Frederick County, Virginia, chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The decision for this Site is based on the Administrative Record.

D. Scope and Role of Response Action

As with many Superfund sites, the problems at the Site are complex. EPA’s immediate assistance was requested by state officials because of the magnitude of the fire. As such, EPA utilized ERT to perform emergency removal activities. In addition to the removal work, EPA organized the long-term remedial cleanup into three operable units (OUs):

- Operable Unit 1: Control of contaminant migration via surface water runoff
- Operable Unit 2: Decommission Dutchman’s Pond
- Operable Unit 3: Potential, Site-wide contamination and decommission the remaining facilities

EPA has already selected the remedy for OU1 in a Record of Decision (ROD) dated June 30, 1988. The ROD selected a remedial action to control contaminant migration off the Site through surface-water runoff. The objective of the OU1 remedial action was to divert and contain surface runoff at the Site and to eliminate oily waste seeps. The selected remedy included soil erosion controls, collection of oily seeps from shallow ground water with an oil-water separator, collection and transport of Site surface water to Rhinehart’s Pond, an increase in the capacity of Dutchman’s Pond and Rhinehart’s Pond, and gravity settling of surface-water runoff in Rhinehart’s Pond. The selected remedy for OU1 has been implemented. The construction of that remedial action was completed on April 30, 1992. An Explanation of Significant Differences (ESD) was issued to include a water treatment plant to treat the surface runoff being collected in Rhinehart’s Pond. Initially, it was thought that the increased capacity in Rhinehart’s Pond would be sufficient to allow the contaminants in the collected water to settle. However, the increased holding time in the pond did not sufficiently remove certain metals to allow discharge of the water, thus necessitating use of a treatment plant.

OU2 addresses the on-Site containment basin known as Dutchman\s Pond. A ROD was prepared in September 1992 to decommission Dutchman’s Pond when it became evident that Dutchman’s Pond was posing a threat to the environment. With only six inches of capacity left, the contaminated surface water and sediment in the pond posed a threat through potential off-Site transport. The selected remedy for OU2 was separation of oil and surface water in Dutchman’s

Pond using the on-Site oil-water separator. The surface water from the oil-water separator was directed to Rhinehart's Pond for treatment using chemical precipitation and solids separation in the existing treatment plant. The treated surface water was discharged to Massey Run. The sediments and liner from Dutchman's Pond were removed and the soils beneath the pond liner exceeding 50 ppm zinc were excavated. The sediment, liner, and contaminated soils were disposed of off-Site. The selected remedy for OU2 has been implemented. Construction of the remedial action was completed on February 15, 1995. An ESD was issued to exclude removal of all of the soils exceeding 50 ppm zinc when it was discovered that removal of some of the deep soil might jeopardize the integrity and stability of the dam at Rhinehart's Pond and might also alter Site drainage patterns.

OU3, the subject of this ROD, addresses the potential soil, ground water, surface water, and sediment contamination on the Rhinehart Tire Fire Site, including any impacts on the surface water and sediment in Massey Run and Hogue Creek. Also included is decommissioning the existing facilities at the Site. OU3 presents the final response action for this Site.

E. <u>Site Characteristics</u>

In 1983, EPA began to investigate the Site to determine if contamination existed and the extent of the contamination. The investigation was conducted in several phases. Detailed discussions of the investigations conducted to date and locations of historic sampling can be found in the Rhinehart Tire Fire Data Summary Report (CH2M HILL, August 1994). The following activities have been conducted to date:

- 1984 — ERT Groundwater Study (EPA ERT, 1984)
- March 1987 — Phase I RI/FS - operable unit 1 (OUl) (Fred C. Hart Associates)
- May 1988 — Endangerment Assessment-Toxicity Report, Bioassay Study (Fred C. Hart Associates)
- June 1988 — Record of Decision for OU1 (EPA)
- August 1988 — Phase II RI - OU2 (Fred C. Hart Associates, Inc.)
- September 1992 — Record of Decision for OU2 (EPA Region III)
- August 1994 — Data Summary Report (CH2M HILL)

The Phase I RI/FS included Site mapping, surface geophysical surveys, soil-gas sampling, surface water and sediment sampling, soil sampling, air sampling, and a ground water survey. The emphasis of the Phase I RI was to address Site conditions associated with OU1. The results of the sampling investigation identified contamination in surface water, sediment, and soil.

The Phase II RI was conducted to address OU2 (Dutchman's Pond) and to determine the effects of the on-Site ash product on local surface water, soil, and ground water (shallow and deep) and to delineate the ash product. The Phase II RI report identified contamination in the surface water, sediment, biota, ground water, fill, and soil.

The overall objective of the OU3 RI/FS was to further characterize and identify potential ground water, soil, surface water, and sediment contamination from the tires that melted during the fire. Surface water and sediment sampling was conducted during the OU3 RI/FS to characterize contamination in Rhinehart's Pond, to evaluate Site impacts on surface water and stream sediments in Massey Run and Hogue Creek, to compare surface water and sediment concentrations in Rhinehart's Pond to background conditions, to compare soil and ground water concentrations to background levels, and to evaluate the effects of surface water runoff and the collection system on Rhinehart's Pond and surface water in Massey Run and Hogue Creek. Concentrations of contaminants detected in the various sampling were compared to background levels, the Region 3 Risk Based Concentrations (RBCs) for human health (cancer benchmark value = 1×10^{-6} ; adjusted Hazard Quotient = 0.1), and the Biological Technical Assistance Group (BTAG) screening values for ecological impacts.

A summary of the physical characteristics of the study area and the results from the sampling events are provided below.

Surface Soil

The main soil types at the Site are silt loams and fill. The main soil groups found at the Site are Weikert-Berks channery silt loam and Blairton silt loam (United States Department of Agriculture, 1982). Channery soil contains more than fifteen percent thin, flat fragments of shale, sandstone, slate, limestone, or schist. Most of the soil has been removed from the Site and the remaining soil is mixed with ash from the fire. The depth to bedrock varies around the Site from outcrops at the surface to approximately eight to ten feet.

The OUl and OU2 remedial investigations included little surface soil sampling. Most of the samples collected were associated with the test pit samples. The results from the test pit sampling were that elevated metal concentrations were detected in all ash and soil/ash samples from Benches 1, 2, and 3. Zinc concentrations found in the OUl and OU2 RI reports were considerably higher than those in the background samples. Zinc concentrations significantly exceeded the background values in two of the seep samples in the OU3 RI. The surface soil samples collected at the Site during the OU3 RI were from three different general locations: north and northeast of Bench 3, the surface seeps north of Bench 4, and background locations. Three samples were collected at each location at approximately the same depth (from 0 to 6 inches). A total of nine surface soil samples was collected during the OU3 RI (Figure 4).

The Chemicals of Potential Concern (COPCs) for the surface soil samples are aluminum, arsenic, beryllium, copper, iron,[2] lead, manganese, nickel, and zinc (Tables 1 and 2). Table 3 is a summary of the detected constituents in the surface soil samples. Figure 5 shows the concentrations of the inorganics (beryllium, iron, manganese, and zinc) detected in the surface soil samples that were selected for evaluation in the OU3 RI.

Beryllium and iron concentrations found in the samples collected on the Site were comparable to

[2] Iron can not trigger a remedial action because it is not a hazardous substance.

or less than the concentrations found in the background samples. Only one sample, SS-1-2, had concentrations for beryllium (at 1.2 mg/kg) and iron (at 39,700 mg/kg), that were above the highest background concentrations at SS-1-B1 (0.91 mg/kg and 33,500 mg/kg, respectively). The concentrations at the other locations are approximately equal to or less than the background levels. Even though the levels of beryllium and iron are comparable to the background levels, they were retained for finther evaluation in the soil because they are COPCs in other media.

The other main contaminants in the Site soils are manganese and zinc. The manganese concentrations in the surface soil samples collected to the northeast of benches 3 and 4 were all above the background concentrations. SS-1-1 and SS-1-3 had manganese concentrations of 646 mg/kg and 1140 mg/kg, respectively, while the highest background concentration was 313 mg/kg. The manganese concentrations in the surface soil samples collected from the seeps were comparable to or less than the background concentrations.

Zinc concentrations at the background sampling locations were detected at concentrations between 37.7 and 45.3 mg/kg. The concentrations were exceeded by sample SS-1-2 (76.2 mg/kg), obtained near the MW-3 monitoring well couplet, and by two samples from the seeps (SS-1-5 at 909 mg/kg and SS-1-6 at 1,080 mg/kg). The zinc concentrations in the seep samples, which are located near a french drain that prevents runoff from entering Massey Run, are an order of magnitude higher than concentrations in any other samples. These values could be associated with the runoff that accumulates in the seep and the previously high values of zinc found in the ground water during the OU1 and OU2 RI reports. All but one sample exceeded the BTAG screening value (10 mg/kg), but none of the sampling data exceeded the RBC value of 2,300 mg/kg.

The other COPCs detected during the OU3 RI were eliminated from consideration in the surface soil. Aluminum, arsenic, and copper were eliminated from further consideration because their concentrations were comparable to background levels. Lead was eliminated because all of the detected concentrations were below background levels and less than the action level of 400 mg/kg. It should also be noted that aluminum, arsenic, copper, and nickel were also eliminated because they were only detected above background levels in the location northeast of benches 3 & 4. Therefore, except for manganese and zinc, the surface soil sampling results show levels that are below either background, BTAG or the RBC values.

<u>Subsurface Soil</u>

Subsurface soil samples were collected during the OU3 RI on the benches and around the monitoring wells using direct-push technology; sampling locations are shown in Figure 6. Two samples were collected at each sampling location unless the geology prohibited a deep sample from being collected.

Tables 4 and 5 show the summary of detected inorganic and organic constituents in subsurface soil samples. The OU1 and OU2 investigations at the Site detected volatile compounds in several of the test pits; however, the recent sampling did not detect any volatile organic compounds. Several semivolatile compounds and pesticides were detected in the subsurface soil samples collected from the four benches. The inorganic compounds were found across the entire

Site, including the background locations (Figure 7).

Twenty-two inorganics were detected in the subsurface soil samples, including 17 that were detected in the background sample (SB-1-26). Eight inorganics (aluminum, antimony, arsenic, beryllium, iron, manganese, thallium, and zinc) were determined to be COPCs, according to human health screening levels.

In general, zinc was the constituent with the largest difference between the concentrations detected in the background and bench samples. Concentrations of zinc are considerably higher in the samples located on the benches (which contained visible ash), than the samples associated with monitoring wells. Zinc also was found in the surface seeps downgradient of Bench 4.

Antimony, arsenic, and manganese are also found in concentrations higher than the background levels in all of the samples from the benches. These constituents are present in the surface soil samples, but the difference between the background samples and the bench samples is not as great as for zinc.

The other inorganics of concern (aluminum and thallium) were not detected frequently at concentrations above the background levels and, therefore, are not considered to be of concern at the Site. Iron and beryllium were included in Figure 7, because they were detected in other media above screening levels.

Several semivolatile organic compounds (SVOCs) and pesticides were detected during the OU3 RI. The most commonly detected SVOC at the Site is bis (2-ethylhexyl) phthalate(DEHP). However, since this compound was also found in comparable levels at the background location and also in the corresponding laboratory blank for several samples, it is not considered a COPC.

During the previous soil sampling, it became apparent that most of the contamination was detected in the ash layers on the benches. This relationship between the ash layers and the detection of pesticides and SVOCs is still present in the samples collected during the most recent field work. Nine subsurface soil samples with the majority of detected compounds all had an ash layer visibly detected in the sample. The samples were collected from the ash layer. The sample with the most detected SVOCs, SB-1-12B, did not have an ash layer associated with it, but a noticeable odor and ash layer were detected in the sample above. Benzo(a)pyrene is the only SVOC determined to be a COPC in the soil but it was only detected in one sample, SB-1-12B, at an estimated concentration of 260 mg/kg. Ash layers or mixed soil/ash layers were visibly identified in 10 of the 29 subsurface soil samples collected. There did not appear to be any significant layers of ash that extended over large areas of the benches.

The sampling data for subsurface soil, compared to the background sampling results, show that arsenic, beryllium, iron, and zinc are the main contaminants of concern for the subsurface soil.

<u>Surface Water and Sediment</u>

Massey Run is the drainage feature nearest to the Site. It receives surface water runoff from the western comer of the Site and the discharge from Rhinehart's Pond. Massey Run is a shallow, intermittent stream that discharges into Hogue Creek, approximately 4,000 feet downstream of the Site. Hogue Creek is classified as a put-and-take trout strewn by the Commonwealth of Virginia.

Surface drainage from the Site discharges into Rhinehart's Pond. The water from Rhinehart's Pond is treated in the on-site treatment facility, then discharged to Massey Run. The pond is approximately 130 feet wide and 14 feet deep at the southwest end and approximately 70 feet wide and 4.5 feet deep at the northeast end.

The locations of surface water samples that were collected from Rhinehart's Pond are shown in Figure 8. Surface water sampling was conducted on two periods during the OU3 RI. During the first event, three ponds (Rhinehart's Pond and two background ponds), Massey Run, and Hogue Creek were sampled. The background ponds and stream sampling are shown in Figure 9. Surface water and sediment sampling sites located off the Rhinehart property were sampled during the second round. A third event was tentatively scheduled to take place during a storm event to collect surface water samples from toe drains, manholes and the runoff-collection outfall from Rhinehart's Pond. However, there was not a storm event with enough duration to create any runoff. Because of an ongoing drought, most of the precipitation that fell during the field event infiltrated into the ground and did not run off. Therefore, the OU3 RI report was issued without this data.

The details of the surface water sampling conducted during the OU3 RI are summarized in Tables 6, 7, and 8. The detected concentrations were compared to the most similar background sampling location. Concentrations from Rhinehart's Pond were compared to the two background ponds while the samples from Massey Run and Hogue Creek were compared to the two samples collected upstream of the confluence of Massey Run and Hogue Creek.

Fourteen inorganic constituents and one SVOC were detected in Rhinehart's Pond, including 11 inorganics that also were detected in the background ponds. Cyanide, manganese, and thallium were the only constituents detected at concentrations that exceeded screening levels.

Cyanide was found in both shallow and deep water samples from the pond but not in background samples. The contamination is primarily in the southwestern part of the pond. Some of the cyanide may be leaving Rhinehart's Pond and being transported downstream because the two samples taken from Massey Run both contained concentrations of cyanide. However, by the time Massey Run enters into Hogue Creek, cyanide was not detected.

Manganese was found in all of the surface-water samples collected from Rhinehart's Pond, but not at levels above background. Thallium was detected in only one sample in Rhinehart's Pond. Thallium was detected infrequently in only one subsurface-soil sample, one surface-water sample from Rhinehart's Pond, one sediment sample from Rhinehart's Pond, and one surface-water sample from Massey Run.

Thallium and cyanide are the contaminants of concern in the surface water.

The sediment is predominantly fluvial deposits and varies in character with the water body. The streams encountered on and around the Site are small, meandering streams. The streams are characterized by upward fining sequences with sediment that ranges in size from clay to cobbles.

The predominant size in the streams are sand and gravel. The sediment associated with the ponds is lacustrine in origin and ranges from clay to gravel, but was primarily fine-grained. The gravel was present in Rhinehart's Pond directly beneath the top layer of soft sediment and prevented the collection of sediment samples at any depth other than the surface. The thickness of the soft sediment in Rhinehart's Pond is approximately 2 to 3 inches. The sediment in the background ponds was typically fine-grained sand, silt, and clay.

Sediment samples were collected from various locations around the Site. Sediment samples were collected from Rhinehart's Pond and off-Site background ponds, from Massey Run and off-Site streams, and from the backwash discharge point in Rhinehart's Pond. The locations of sediment samples that were collected are shown in Figures 10 and 11. The three manhole sampling locations were not sampled because of the lack of any sediment in the structures. The details of the sediment sampling conducted during the RI are summarized in Tables 9, 10, 11, and 12.

Sampling results from the Phase I RI show low levels of organic contaminants as well as inorganic contaminants detected in sediment samples. Sampling results from the Phase II RI show semivolatile organic contaminants were detected at levels above background in the sediment from Rhinehart's Pond and the drainage ditch in Bench 3. Zinc was detected at concentrations significantly above background in Rhinehart's Pond. Sampling results from the OU3 RI show numerous inorganics (such as arsenic, cadmium, copper, lead, mercury, nickel, selenium, and zinc) were detected in the sediment samples from Rhinehart's Pond. In particular, zinc was detected at concentrations above background. Several inorganics (such as copper, cyanide, iron, and zinc) were detected in the eight sediment samples taken from Massey Run, the unnamed tributary, and Hogue Creek. Again, zinc was detected at concentrations above background.

Ground Water

Ground water is found primarily in fractures and bedding plane openings because the primary porosity of shale and siltstone is extremely low. Most of the ground water under the Site is expected to be found in secondary porosity associated with the fracture system.

Previous investigations at the Site divided the ground water flow into two zones, the first being shallow ground water in the overburden and upper bedrock and the second being fractured flow through the deeper bedrock.

During the OU3 RI, it was determined that there is only a poorly developed shallow ground water system at the Site, with few fractures or other pathways to allow ground water movement. Slug test values for hydraulic conductivity in shallow wells were on the order of 0.47 feet per day (fpd) compared to 12 fpd in the bedrock. There was no obvious discharge to Massey Run on the Site during most of the OU3 investigation. Although the summer of 1997 was unusually dry, water levels in the wells installed in the bedrock boreholes rose to depths ranging from 7 to 25 feet, indicating that ground water was available at sufficient hydraulic head in the bedrock to fill a shallow ground water system if sufficient fractures and other connected openings were present to allow ground water to move through them. This evidence suggests that there is only a poorly developed shallow ground water system at the Site, with few fractures or other pathways to allow ground water movement. Benches 2 and 3 have an underlying drainage system that collects surface runoff water and discharges it to Rhinehart's Pond. Therefore, recharge of the ground water system is limited over much of the Site.

Significant amounts of ground water were encountered in two intervals in the bedrock: from about 20 to 50 feet deep and from about 60 to 80 feet deep. These intervals are described as shallow and deep, respectively. In many parts of the Site, the hydraulic heads in the two intervals are similar, suggesting that they are hydraulically connected, probably through vertical fractures. However, at well couplets MW-3 and MW-6, the water levels differ, by as much as 6 feet between the shallow and deep intervals, suggesting some degree of hydraulic separation. At most locations measured during the OU3 RI, the water levels in the shallower wells were higher than those in the deeper wells. This relationship suggests that ground water within the bedrock aquifer is moving downward over most of the Site.

Water level data indicate that the primary direction of ground water flow is northwest, towards Massey Run for both the shallow wells and the deeper wells. Flow to the northwest is consistent with the slope of the topography and the location of the likely ground water discharge areas.

During this investigation, ground water samples were collected from 14 monitoring wells, 3 residential wells, and 2 residential springs.

<u>Monitoring Well Investigation</u>

Twelve on-Site monitoring wells and two background monitoring wells were sampled during the OU3 RI investigation. The monitoring wells are screened within shallow and deep bedrock fracture zones. A summary of detected analytes in ground water is presented in Table 13. Four inorganic constituents (arsenic, barium, iron, and manganese) were detected in the dissolved (or filtered) and total (or unfiltered) ground water samples at concentrations above the RBC values. The OU1 and OU2 investigations indicated that zinc was considered to be a potential concern at the Site but may be attributed to the use of galvanized screens in the monitoring wells. The total zinc concentrations that were detected during the 1985 ground water study and the OU2 RI were from five times to an order of magnitude higher than the Region III RBC for the ingestion of tap water (1,100 micrograms per liter [µg/L] adjusted for hazard index of 0.1). The dissolved ground water samples were rejected because of problems with quality assurance/quality control (QA/QC); therefore, a comparison could not be conducted. All of the monitoring wells that contained galvanized screens were abandoned during this investigation and new wells were installed at locations upgradient from the abandoned wells. During the OU3 investigation, zinc was not detected in the ground water at concentrations exceeding the screening values. The arsenic, iron, and manganese concentrations detected on-Site were comparable to background concentrations. The mean concentrations of arsenic, iron, and manganese, respectively in the monitoring wells are 5.0, 2,059, and 1,405, whereas the mean concentrations of the background wells are 10.6, 2,339, and 1,310.

<u>Residential Wells and Springs</u>

Ground water samples were collected from three residential wells and two springs located within

0.5 mile of the Site during the OU3 investigation. The locations of the residential wells and springs were selected based on locations that were downdip from the Site and were most likely to be affected by deep ground water transport from the Site. The nearest wells downgradient of the Site would have been downstream from the Site in the valley along Hogue Creek, where ground water effects from the Site would be very unlikely. The residential wells and springs are used as a potable source for most residences; therefore, the constituent concentrations were compared to the federal maximum contaminant level (MCLs). The total and dissolved constituent concentrations in all of the residential well and spring samples were below the federal MCLs.

F. Current and Potential Future Land and Resource Uses

As stated previously, the Site is located in a rural area of Frederick County, Virginia, approximately six miles west of Winchester. The land at the Site and in the immediate vicinity consists of scenic, rolling hills. The owner of the Site still lives on the property, on the other side of the hill from the Site. Although no other homes are presently within view of the Site, EPA has utilized residential use as the reasonably anticipated future land use.

In addition, although no one presently uses the ground water at the Site, EPA believes that the ground water should be considered as a potential drinking water source. All of the residents in this area utilize ground water for their potable water source.

According to the Virginia Stream Use Classification, Massey Run and Hogue Creek, as tributaries of the Potomac River in Frederick County, are classified as Mountainous Zones Waters. In addition, Hogue Creek is a put-and-take trout stream.

G. Summary of Site Risks

Summary of Human Health Risk Assessing

The baseline risk assessment estimates what risks the Site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for this Site.

Identification of Chemicals of Potential Concern

The chemicals of potential concern (COPC) were selected based on a comparison of the maximum detected concentration in a given medium to a corresponding risk-based concentration (RBC) as presented in EPA Region III's *Risk-Based Concentration Table.* A chemical that had a maximum detected concentration that exceeded its corresponding RBC was selected as a COPC and included in the quantitative evaluation of risk for the Site.

Exposure Assessment

Exposure assessment evaluates potential human exposure to Site-related COPCs present or potentially migrating from the Site. The purpose of the exposure assessment is to identify and evaluate the contaminant source, release mechanisms, exposure pathways, exposure routes, and receptors. A conceptual Site model was developed to consider all potential receptors (i.e., residential, industrial) and exposure pathways (i.e., ingestion, dermal contact, and inhalation) applicable to the Site. Each receptor and exposure pathway was evaluated to determine if they were reasonable for the Site.

The second step in the exposure assessment is quantifying the exposure and involves estimating the exposure point concentration (EPC) and chemical intake. In general, EPCs are calculated for each COPC as the 95 percent upper confidence limit (UCL) on the arithmetic mean for the distribution most closely associated with the data set (either normal or lognormal). However, in some instances, the calculated 95% UCL is greater than the maximum detected concentration as a result of limited data sets or variability in the data set. In these instances, the maximum detected concentration is used as the EPC.

Toxicity Assessment

The toxicity assessment weighs the available evidence regarding the potential for a particular chemical to cause adverse effects in exposed individuals and provides an estimate of the relationship between the extent of exposure and possible severity of the adverse effects.

Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Risk = CDI x SF

where: risk = a unitless probability (e.g., $2 \times 10^{-5)}$ of an individual's developing cancer)
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as (mg/kg-day)-1.

These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}) . An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposures is 10^{-4} to 10^{-6}.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ < 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that contaminant is unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI < 1 indicates that, based on the sum of all HQ's from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI > 1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

where:

CDI = Chronic daily intake

RfD = reference dose.

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Risks were evaluated for exposure to Site soils for current youth and adult trespassers, future child and adult residents, and future construction workers, exposure to ground water for current and future residents, exposure to surface water and sediment in Rhinehart's Pond for current youth and adult trespassers, and exposure to surface water and sediment in Massey Run and Hogue Creek for current youth and adult recreational users.

Exposure to surface soil (current trespasser and future resident scenarios) and subsurface soil (future resident scenario) based on Site concentrations would result in risks and hazards above EPA target levels if the Site is used for residential development in the future. Use of ground water as a residential potable water supply (future resident scenario) would also result in risks and hazards above EPA target levels based on Site concentrations. Surface water and sediment do not pose risks or hazards greater than EPA target levels to potential receptors. However, ingestion of fish caught from Hogue Creek may pose noncarcinogenic hazards above EPA target levels.

The risk drivers associated with the Site media are:

Ground water: arsenic, iron, and manganese

Surface Soil: arsenic, beryllium, and iron

Subsurface Soil: aluminum, antimony, arsenic, beryllium, iron, and zinc

Surface Water (from fish ingestion): thallium and zinc

The toxicity profiles of these contaminants, except for iron and manganese, are as follows:

Aluminum. Aluminum is a common, virtually ubiquitous element. This metal has been used in smelting, refining, electrical, aircraft, automotive, jewelry, petroleum processing, and rubber industries (Sittig, 1985). Aluminum foil is widely used in packaging. Aluminum is not generally noted for toxicity. Some aluminum salts have been associated with skin and respiratory irritation.

Inhalation of aluminum powder has been reported to cause pulmonary fibrosis. Some studies have suggested a link between aluminum exposure and Alzheimer's disease. (Sax, 989; Sittig, 1985) Aluminum has not been classified as a carcinogen by EPA.

Antimony. Antimony has been used in mining, smelting, refining, and alloy abrasive manufacture. Antimony has also been used in ammunition, batteries, pigments, plasticizers, glass, enamels, pottery, pharmaceuticals, and explosives (Sittig, 1985). Antimony compounds can cause skin irritation. Acute oral ingestion of antimony can produce extreme irritation of the GI tract, and in extreme cases, circulatory or respiratory failure. Chronic oral toxicity may be associated with dry throat, nausea, and anorexia. Other target organs include the liver and kidney. Antimony has not been, classified as a carcinogen.

Arsenic. Arsenic is a metal that is present in the environment as a constituent of many organic and inorganic compounds. Arsenic is a known human carcinogen implicated in skin cancer in humans. Inhalation of arsenic by workers is known to cause lung cancer. Arsenic compounds cause chromosome damage in animals, and humans exposed to arsenic compounds have an increased incidence of chromosomal aberrations. Arsenic compounds are reported to be teratogenic, fetotoxic, and embryotoxic in some animal species. Dermatitis and associated lesions are attributable to arsenic coming into contact with the skin, with acute dermatitis being more common than chronic. Chronic industrial exposures may be characterized by hyperkeratosis, and an accompanying hyperhidrosis (excessive sweating usually of the palms and soles of the feet).

Beryllium. Beryllium is used in alloys as well as X-ray and nuclear applications. The major source of beryllium exposure of the general population is from the combustion of coal and oil. (Casarett and Doull, 1986) Adverse effects can include respiratory effects (after inhalation exposure) or contact dermatitis. Other target organs include the liver, spleen, and heart (Sittig, 1985). Beryllium is classified by EPA as a Group B2 probable human carcinogen via the oral and inhalation routes.

Thallium. Thallium is a byproduct of iron, cadmium, and zinc refining. It has been used in alloys, optical lenses, jewelry, semiconductors, and dyes and pigments. Thallium compounds have been used as pesticides. (Casarett and Doull, 1986) Thallium toxicity can result in hair loss, gastrointestinal irritation, paralysis, nephritis, and liver necrosis. Thallium is one of the more toxic metals, with an estimated lethal dose in humans of 8 to 12 mg/kg. (Casarett and Doull, 1986).

Zinc. Zinc is a bluish-white metal that is stable in dry air, but becomes covered with a white coating on exposure to moist air. Zinc is present in abundance in the earth's crust. Zinc chloride is used as a wood preservative, in dry battery cells, in oil refining operations, and in the manufacture of dyes, activated carbon, deodorants and disinfecting solutions. Zinc chromate and zinc oxide are used primarily as pigments. Exposure to zinc compounds can cause skin sensitization, irritation of the nose and throat, fever, and fatigue. Zinc is a common element and an essential metal not usually noted for toxicity. Intake occurs mainly from the diet, and the average American daily intake is reported to be approximately 12 to 15 g. About 20 to 30 percent of ingested zinc is absorbed (Casarett and Doull, 1986). Some zinc salts can be irritants. Gastrointestinal symptoms have sometimes been reported after ingestion of high zinc concentrations. Metal fume fever can result from inhalation of zinc fumes (Casarett and Doull, 1986). Zinc is, not classified as a carcinogen by EPA.

Because the risk drivers are inorganic constituents, a background study of the soil, ground water, surface water and sediment was conducted. The background study included a statistical comparison of Site sample concentrations to background sample concentrations. The distribution of the Site sample populations and the background populations were determined. If the two populations were determined to be of the same distribution, the Student t-test was used for the statistical comparison. If the two data sets were of different distributions, the Mann Whitney U Test was used for the statistical comparison.

The background comparison indicates that the inorganic constituents identified as risk drivers in the Site soil (surface and subsurface) and ground water were detected at concentrations that are statistically comparable to background levels. Therefore, the risks associated with soil (surface and subsurface) and ground water, based on the Site concentrations, appear to be consistent with background levels and not associated with Site activities. Iron can not trigger a remedial action at the Site because it is not a hazardous substance.

Human Health Risk Summary

The human health risk assessment indicated a potential risk associated with exposure to inorganics in the surface soil, subsurface soil, and ground water at the Site. However, the background study was conducted and indicated that the inorganic levels detected in the surface soil, subsurface soil, and ground water are statistically comparable to background levels. Since the potential risks are attributed to background levels, the surface soil, subsurface soil, and ground water do not require remediation and will not be considered when developing remedial action objectives (RAOs).

However, the potential risk associated with ingestion of fish from Hogue Creek resulted in noncancer hazards above recommended levels. Therefore, a remedial action objective will be developed to mitigate this potential risk.

Summary of Ecological Screening Assessment

The objective of the ecological screening assessment is to develop information for determining risk or harm to ecological resources from exposure to contaminants from a Site.

Exposure Pathways and Ecological Receptors

An exposure pathway is the pathway that a contaminant travels from its source to a potential receptor.

Rhinehart's Pond. Elevated concentrations of contaminants within sediment and surface water in the pond provides an exposure pathway for benthic and aquatic species. Benthic organisms can be directly exposed to contaminants in the sediment through contact with outer membranes or respiratory surfaces. Benthic organisms also may ingest contaminated sediment. Aquatic species and waterfowl, wading birds, amphibians, reptiles, and mammals are directly exposed to contaminated surface water. Ingestion of contaminated water and sediment and bioaccumulation are other potential exposure pathways.

Massey Run and Hogue Creek. Contaminants in sediment and surface water in the creeks provide an exposure pathway for benthic and aquatic species. Benthic organisms can be exposed directly to contaminants within the sediment through contact with outer membranes or respiratory surfaces. Benthic organisms also may ingest contaminated sediment. Aquatic species and waterfowl, wading birds, amphibians, reptiles, and mammals are directly exposed to contaminated surface water. Ingestion of contaminated water and sediment and bioaccumulation are other potential exposure pathways.

Uplands. Biota potentially at risk within the upland areas are species that contact soil while foraging. Species such as muskrats and woodchucks may contact contaminated soil while digging for food or burrowing. Ingestion of prey containing elevated levels of contaminants is another potential exposure pathway.

Ecological Benchmarks

The ecological benchmarks used for the sediment from aquatic habitats are derived from the National Oceanic and Atmospheric Administration (NOAA) guidance document that identifies concentrations of contaminants in sediment that may have significant potential for adverse effects (Long et al., 1995). The guidance contains two values: effects-range low (ER-L) and effects-range median (ER-M). The ER-L represents the concentration of a contaminant equivalent to the lower 10th percentile of available data in which effects on organisms were observed. The ER-M represents concentrations equivalent to the 50th percentile of available data in which effects were detected. As agreed to with the Biological Technical Assistance Group (BTAG), the more conservative ER-L concentrations are used in this ecological screening risk assessment. Ecological benchmarks for sediment parameters that do not have an ER-L value are based on the *Region III BTAG Screening Levels* (Interim Draft Date January 1996) or are based on benchmarks provided by Region III BTAG.

Ecological benchmarks for surface water data are derived from Virginia Standards for Surface Water (VR680-21-01.14) and from surface water benchmarks identified in the *Region III BTAG Screening Levels* (Interim Draft Date January 1996).

Ecological benchmarks for soil data are derived from *Region III BTAG Screening Levels* (Interim Draft Date January 1996).

Ecological Risk Screening Characterization

The characterization of risk to ecological resources is evaluated using hazard quotients (HQ). A HQ is calculated for each parameter according to the Region III Ecological Risk Assessment Guidance for Superfund (1997). The HQ is calculated by dividing the ecological benchmark for a particular media into the maximum concentration for each parameter. HQ values greater than 1.0 indicate the potential for risk to ecological resources. Because this is a screening-level ecological risk assessment, the HQ values are used to identify parameters that may potentially pose a risk to ecological resources; therefore, the magnitude of the HQ for a parameter is not considered to be indicative of the magnitude of the potential for risk.

Inorganics were the main driver of the ecological risks in the sediment and surface water in Rhinehart's Pond and Massey Run.

Rhinehart's Pond

Several metals, including arsenic, cadmium, copper, lead, mercury, nickel, selenium, and zinc were detected in the sediment in Rhinehart's Pond : at concentrations that exceed the ecological benchmarks. With a value of 21.3, zinc was the metal that resulted in the highest HQ.

Cyanide was the only constituent detected in the surface water at a concentration that exceed the ecological benchmark.

Massey Run and Hogue Creek

Metals detected in concentrations resulting in HQ values higher than 1.0 include arsenic, copper, nickel, and zinc. With a value of 46, zinc was also the metal that was detected in the sediment in Massey Run that resulted in the highest HQ.

Several metals, including copper, cyanide, iron, and zinc were detected in the surface water from the two creeks at concentrations that exceed benchmarks. HQ values for these metals ranged between 22.66 for iron and 1.94 for cyanide.

Uplands

The evaluation of the surface soil collected from the Site indicated that metals were detected in concentrations resulting in HQ values greater than 1.0. The metals that had HQ values greater than 1.0 include beryllium, chromium, copper, iron, lead, manganese, nickel, and zinc. The concentrations of the metals are considered to be associated with background levels.

Sediment Toxicity Testing

As a result of the ecological screening and in preparation of the prelimiriary remediation goal for the sediment removal, the EPA Emergency Response Team (ERT) conducted an Ecological Risk Assessment, which included toxicity evaluation of the sediment in Rhinehart's Pond and Massey Run. Of all the metals calculated to pose a potential risk, as determined from EPA's toxicity evaluation, zinc was determined to pose the highest risk to the ecological receptors at the Site, and appears to be the driver of the risk found at the Site. The threat to aquatic receptors was evaluated using sediment toxicity testing. The toxicity test identified the threshold zinc concentration in sediment above which an ecological threat is expected to exist of between 1,600 and 4,800 mg/kg, dry weight.

Ecological Screening Assessment Summary

In summary, the potential adverse impacts on ecological receptors is associated with zinc in the sediment and cyanide and iron in the surface water in Rhinehart's Pond and Massey Run.

H. Remedial Action Objectives

The statutory scope of CERCLA was amended by SARA to include the following general objective for remedial action at all Superfund Sites:

- Remedial actions “shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further releases at a minimum which assures protection of human health and the environment” (Section 121(d)).

As shown above in Section G, Summary of Site Risks, surface soil, subsurface soil, and ground water are either statistically comparable to background levels or do not pose a risk to human health or the environment. Since the potential risks are attributed to background levels, the surface soil, subsurface soil, and ground water do not require remediation and will not be considered when developing remedial action objectives. The media warranting remediation then are the surface water in Rhinehart’s Pond and the sediment in Rhinehart’s Pond and a portion of Massey Run, based on the ERT Ecological Risk Assessment, As such, Remedial Action Objectives (RAOs) were developed for the surface water in Rhinehart’s Pond and the sediment in Rhinehart’s Pond and Massey Run. The RAOs for OU3 of the Site are to

- Prevent ecological exposure to levels of zinc exceeding 1,600 mg/kg in the sediment in Rhinehart’s Pond and Massey Run.

- Prevent migration and leaching of contaminants in the sediment that may contaminate the surface water in Rhinehart’s Pond, Massey Run, and Hogue Creek.

- Decommission the remaining facilities at the Site, including removal and proper disposal of the oil/water separator, water treatment plant, and Site fence, abandoning the subsurface drainage system and monitoring wells, removing the shotcrete, and removing the dam on Rhinehart’s Pond..

The final RAO was added because this is the final ROD for the Site and these facilities will not be needed after implementing the ROD remedy.

I. <u>Description of Alternatives</u>

Three alternatives (not including the No Action Alternative) have been developed to meet the RAOs listed above. The alternatives developed are as follows:

- Alternative RHP S-2, Limited Action

- Alternative RHP S-3, Capping

- Alternative RHP S-4, Sediment Removal and Disposal at a Subtitle D Landfill

Description of Remedy Components

The following are the major components of each alternative listed above:

<u>Alternative RHP S-1, No Action</u>

- Treatment Components

  – None

- Containment Components
  - Approximately 1,000 cubic yards of contaminated sediment in Rhinehart's Pond and 15 cubic yards in Massey Run will remain in place.
  - 5-year reviews would be required.
- Institutional Control Components
  - None

<u>Alternative RHP S-2, Limited Action</u>

- Treatment Components
  - None
- Containment Components
  - Approximately 1,000 cubic yards of contaminated sediment in Rhinehart's Pond and 15 cubic yards in Massey Run will remain in place.
  - Fencing, bird netting, or other barriers would be placed to prevent exposure by ecological receptors. The barriers would require long-term maintenance.
  - Fish tissue monitoring and 5-year reviews would be required.
- Institutional Control Components
  - Excavation in areas of sediment contamination will be prevented, using land use restrictions or other tools.

<u>Alternative RHP S-3, Capping</u>

- Treatment Components
  - The surface water in Rhinehart's Pond will be treated while de-watering the pond.
- Containment Components
  - Approximately 15 cubic yards of contaminated sediment in Massey Run would be removed and added to the 1,000 cubic yards of contaminated sediment in Rhinehart's Pond prior to placement of the cap. The cap would require long-term monitoring to assure it remains effective.
  - Fish tissue monitoring and 5-year reviews would be required.
- Institutional Controls

- Excavation in areas of sediment contamination will be prevented, using land use restrictions or other tools.

Alternative RHP S-4, Sediment Removal and Disposal in a Subtitle D Landfill

- Treatment Components

  - The surface water in Rhinehart's Pond will be treated while de-watering the pond. Also, the sediment may have to be treated to remove excess water prior to off-Site disposal. Any excess water generated from the sediment will be treated either in the on-Site water treatment plant or at an off-Site facility prior to discharge.

- Containment Components

  - Approximately 1,015 cubic yards of sediment would be removed from Rhinehart's Pond and Massey Run. Toxicity Characteristic Leaching Procedure (TCLP) testing in May 2000 has shown that the sediment is not a hazardous waste; as such the sediment will be disposed of in a Subtitle D Landfill.

- Institutional Controls

  - None

Common Elements and Distinguishing Features of Each Alternative

All of the alternatives include decommissioning the existing facilities, including: removing the shotcrete; abandoning the existing subsurface drainage system; abandoning the existing monitoring wells installed for the RI; removing the fencing; removing the oil/water separator; removing the water treatment plant; removing the dam on Rhinehart's Pond; and regrading and reseeding the Site.

A list of the alternatives with the estimated capital, operation and maintenance, and present worth costs follows. Also included is the estimated construction timeframe.

Alternative RHP S-1: No Action

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $18,750
Estimated Present Worth Cost: $52,000
Estimated Construction Timeframe: N/A

Alternative RHP S-2: Limited Action

Estimated Capital Cost: $59,000
Estimated Annual O&M Cost: $35,000

Estimated Present Worth Cost: $400,000
Estimated Construction Timeframe: 2 months

Alternative RHP S-3: Capping

Estimated Capital Cost: $445,000
Estimated Annual O&M Cost: $38,000
Estimated Present Worth Cost: $835,000
Estimated Construction Timeftame: 3 months

Alternative RHP S-4: Sediment Removal and Disposal at a Subtitle D Landfill

Estimated Capital Cost: $658,000
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $658,000
Estimated Construction Timeftame: 4 months

The above costs and construction timeframes do not include decommissioning the existing facilities listed at the beginning of this section because the cost and the time associated with the decommissioning would be the same for each alternative. As seen above, the estimated construction timeframe varies little from each of the alternatives, ranging from two months to complete Alternative RHP S-2, Limited Action, to four months to complete Alternative RHP S-4, Sediment Removal. Of course, Alternative RHP S-1, No Action would not take any time to complete because there would be no construction taking place. The estimated present worth cost varies from a low of $52,000 for Alternative RHP S-1, No Action, to a high of $835,000 for Alternative RHP S-3, Capping.

Decommissioning the existing facilities is expected to take from four to six months. The cost of decommissioning all of the existing facilities is approximately $889,000.

The major ARARs associated with the proposed action are the Virginia Water Quality Standards and the Federal Fish and Wildlife Coordination Act. The only Alternatives which would not be in compliance with all ARARs are Alternatives RHP S-1—No Action and RHP S-2—Limited Action, both of which do not comply with all of the Virginia Water Quality Standards. Alternatives RHP S-3—Capping and RHP S-4—Sediment Removal would meet all ARARs.

As the only alternative which does not leave any waste on-Site and thereby not require long-term maintenance of the remedy, Alternative RHP S-4, Sediment Removal, ranks as the best of the alternatives in regard to long-term reliability. Because all of the contaminated sediment would be removed, Alternative RHP S-4, Sediment Removal, would not have a potential for remedy failure.

Expected Outcomes of Each Alternative

With the estimated construction period for the alternatives ranging from only two to four months, the alternatives are basically ranked evenly with respect to the time it will take to achieve available use. However, Alternative RHP S-4, Sediment Removal ranks higher than the other two construction alternatives with respect to the available uses of the land upon completion. Alternative RHP S-4, Sediment Removal, would not require institutional controls to prohibit excavation in the areas of sediment contamination. The other three alternatives would require such controls.

J. Summary of Comparative Analysis of Alternatives

All four of the remedial action alternatives described above were assessed in accordance with the nine evaluation criteria as set forth in the NCP at 40 C.F.R. §300.430(e)(9). These nine criteria are categorized below into three groups: threshold criteria, primary balancing criteria, and modifying criteria.

THRESHOLD CRITERIA

1. Overall protection of human health and the environment; and

2. Compliance with applicable or relevant and appropriate requirements (ARARs).

PRIMARY BALANCING CRITERIA

3. Long-term effectiveness and permanence;

4. Reduction of toxicity, mobility, or volume through treatment;

5. Short-term effectiveness;

6. Implementability; and

7. Cost.

MODIFYING CRITERIA

8. State acceptance; and

9. Community acceptance.

These evaluation criteria relate directly to requirements in Section 121 of CERCLA, 42 U.S.C. Section 9621, which determine the overall feasibility and acceptability of the remedy.

Threshold criteria must be satisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to weigh major trade-offs between remedies. State and community acceptance are modifying criteria formally taken into account after public comment is received on the Proposed Plan. A summary of the relative performance of the alternatives with respect to each of the nine criteria follows. This summary provides the basis for determining which alternative provides the “best balance” of tradeoffs with respect to the nine evaluation criteria.

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

All of the alternatives, except the no-action alternative, are protective of human health and the environment by eliminating, reducing, or controlling risks posed by the Site through removal, engineering controls, and/or institutional controls. Alternative RHP S-2 would provide adequate protection from exposure to the contaminated sediment through engineering controls such as bird netting and fencing and institutional controls such as land use restrictions. Alternative RHP S-3 would provide greater protection from exposure to the contaminated sediment through engineering controls such as the cap and institutional controls such as land use restrictions. However, perpetual cap maintenance would be required to ensure total protectiveness. Alternative RHP S-4 would provide the greatest protection by actually removing all of the contaminated sediment from the Site.

Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and the NCP at 40 C.F.R. §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA Sites attain at least legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of both Federal and State environmental statutes or provides a basis for a waiver of these requirements.

All alternatives, except the No Action alternative, have common ARARs associated with their respective remedies. The only alternatives which do not meet all ARARs are Alternatives RHP S-1, No Action, and RHP S-2, Limited Action, both of which do not meet all of the Virginia

Water Quality Standards. Although EPA has consulted the U.S. Fish and Wildlife Service with regard to remediation of the Site, a wetlands delineation has not yet been completed. If wetlands are found to be present on the Site, the remedy will incorporate any and all requirements necessary.

Long-term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain on-Site following remediation and the adequacy and reliability of controls.

Alternative RHP S-1, No Action will not be effective over the long-term because this alternative leaves the Site in its present state. Alternative RHP S-2, Limited Action, may be effective over the long-term in reducing contaminant exposure to ecological receptors. Engineering controls would be established to deter ecological receptors from using the pond as a habitat, but these controls would not address migration of contamination, nor provide an ecologically protective habitat at this location. Alternative RHP S-3, Capping, will require maintenance in the form of monitoring the depth of the clean sediment cap to ensure that contaminated sediments are not exposed to surface water or other receptors. Alternative RHP S-4, Sediment Removal, will achieve the highest degree of long-term effectiveness and permanence by removing all of the contaminated sediment from the Site. There would be no need to monitor the Site because all of the contamination would be removed and disposed of off-Site.

Because hazardous substances would remain on-Site in concentrations above acceptable levels under Alternatives RHP S-1, S-2 and S-3, reviews at least every five years, as required, would be necessary to evaluate the effectiveness of these alternatives. All of the sediment is removed and disposed of off-Site under Alternative RHP S-4. Because unlimited use and unrestricted exposure will be allowed after completion of the remedial action, five-year reviews are not required.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

None of the alternatives developed to remediate the Site include treatment of the sediment. The sediment is left in place in Alternatives RHP S-1, S-2, and S-3. Only Alternative RHP S-4 includes removal of the sediment. TCLP testing on the sediment shows that the sediment is not a hazardous waste. As such, treatment would be superfluous because the sediment can be disposed of in a Subtitle D landfill without treatment. However, dewatering of the sediment may be necessary prior to disposal.

Short-Term Effectiveness

Short-term effectiveness addresses the time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternative RHP S-1, No Action, will not be effective in the short-term because current risks from direct contact would continue to exist. Alternative RHP S-2, Limited Action, will achieve its objectives in the short-tem, and will create minimal short-term adverse effects. Both Alternatives RHP S-3 and S-4 will achieve their objectives upon implementation. Any short-term adverse effects created by implementation of these alternatives during the three to four months of construction can be easily mitigated.

Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Each sediment alternative evaluated is technically feasible. Alternative RHP S-2, Limited Action, involves simple fencing and installation of bird netting, all of which could be performed with general construction measures. Alternative RHP S-3, Capping, would require dewatering of Rhinehart's Pond. Surface water in Rhinehart's Pond would be diverted to the on-Site water treatment plant; temporary holding tanks could be brought on-Site to hold additional pond water if necessary. A small earthen dam would be constructed to divert the surface water in Massey Run while the sediment is removed. This sediment would then be combined with the sediment in Rhinehart's Pond. Clean fill for the cap would be transported to the Site and stored at a staging area established for fill and equipment. In order to remove the sediment for Alternative RHP S-4, Sediment Removal, Rhinehart's Pond must be dewatered using the same techniques described above. A drying bed would be constructed to remove the excess water from the excavated sediment. The sediment would be disposed of at an off-Site Subtitle D landfill. Clean fill may be used to line the pond and a section of Massey Run after the sediments are removed. Clean soil for Alternatives RHP S-3 and RHP S-4 can be transported to the Site and stored at a staging area established for fill and equipment.

Although each sediment alternative evaluated is administratively feasible, Alternative RHP S 4, Sediment Removal, would be the easiest to implement administratively. Under Alternatives RHP S-2, Limited Action, and RHP S-3, Capping, contaminated sediment would remain on-Site, requiring a Site review every 5 years. Institutional controls would also be required for these two alternatives to limit future land uses on the Site. Alternative RHP S-4 Sediment Removal, would require Site access restrictions only until the sediment removal has taken place.

Fencing materials for Alternative RHP S-2, Limited Action, are readily available and can be installed using common construction practices. Bird netting can be attained from specialty distributors. Standard earthmoving and construction equipment would be used for Alternatives RHP S-3, Capping, and RHP S-4, Sediment Removal. Clean soil or sediment are available locally to install a sediment cap over contaminated soil.

Cost

The estimated cost for decommissioning the existing facilities is $889,000. This cost is not included in the description of the three sediment remediation alternatives discussed below to make a better comparison of their relative costs.

The estimated present worth costs for the alternatives, not including the No Action alternative, range from $400,000 for Alternative RHP S-2 to $835,000 for Alternative RHP S-3. The present worth costs are heavily dependent on whether fish tissue monitoring and 5-year reviews are necessary. Because neither are necessary for Alternative RHP S-4, the present worth costs for this alternative ($658,000) are less than the present worth costs for Alternative RHP S-3, even though the sediment is removed as part of Alternative RHP S-4. This relationship is shown in the following table detailing the capital, O&M, and present worth costs for each of the four alternatives.

TABLE 14
Cost Summary for the Sediment Alternatives

Rhinehart Tire Fire Site
Operable Unit 3

Alternative	Capital Cost ($)	Annual O&M ($/year)	O&M Period (years)	5-year Site Review ($/5 years)	Total O&M Present [a] Worth ($)	Total Present Worth ($)
RHP S-1—No Action	0	0	30	18,800	52,000	52,000
RHP S-2—Limited Action	59,000	12,500 [c] 35,000 [d]	30	18,800	290,000	400,000
RHP S-3—Capping	445,000	15,500 [c] 38,000 [d]	30	18,800	338,000	835,000
RHP S-4—Removal, Stabilization, and Disposal in a Subtitle D Landfill	658,000	0	0	0	0	658,000

[a] Present-worth costs from operation and maintenance include 5-year Site reviews.

[b] Capping costs vary depending on cap construction materials.

[c] Annual operation and maintenance costs after first 5 years.

[d] Annual operation and maintenance costs for the first 5 years. (Fish tissue monitoring costs will be included in O&M for the first 5 years.)

The total costs for each of the alternatives, including the decommissioning costs, are shown in the table below.

TABLE 15 Summary of Costs Rhinehart Tire Fire Site Operable Unit 3			
Total Present Worth ($)			
Alternative	**Sediment Alternative**	**Decommissioning of Remedial Features**	**TOTAL COST**
RHP S-1—No Action	$ 52,000	$ 889,000	$ 941,000
RHP S-2—Limited Action	$ 400,000	$ 889,000	$ 1,289,000
RHP S-3—Capping	$ 835,000	$ 889,000	$ 1,724,000
RHP S-4—Removal and Disposal in a Subtitle D Landfill	$ 658,000	$ 889,000	$ 1,547,000

State/Support Agency Acceptance

The Virginia Department of Environmental Quality has expressed its support for Alternative RHP S-4, Sediment Removal (see letter dated September 26, 2000).

Community Acceptance

Comments received during the public comment period varied widely as to what approach should be taken to deal with the remaining contamination at the Site. Frederick County expressed a preference for RHP S-1, No Action, or RHP S-2, Limited Action. A petition signed by 115 residents of Frederick County supported a complete cleanup of the Site as proposed by EPA at the 9/12/00 public meeting and urged the cleanup be completed in a timely manner, to be finished as soon as possible with no interference from the State or County. Please refer to the Responsiveness Summary of this Record of Decision for a more comprehensive summary of the community's views.

During the comment period, the Frederick County Board of Supervisors also stated a preference for maintaining the dam at Rhinehart's Pond. In response to this comment, in the future, EPA may revise the remedy to include an option which would leave the dam in its present condition. However, before EPA may consider this option, the County or some other entity must acquire possession of the dam and the land on which the dam and the pond are located, and agree to maintain the dam and pond prior to completion of the remedial design for the remedy. If EPA does decide to revise the remedy, it will do so consistent with the procedures contained in the NCP. The County also suggested that EPA leave the shotcrete in place, cover it with fill, and revegetate the slope instead of removing the shotcrete. In response, EPA agrees to investigate the feasibility of leaving the shotcrete in place and covering it with clean fill during the remedial design.

K. Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a Site wherever practicable (NCP §300.430(a)(1)(iii)(A)). In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur.

Due to the prior response actions at the Site, no principal threat wastes remain at the Site. Therefore, the expectation established in the NCP that EPA will use treatment to address principal threat wastes does not apply.

L. Selected Remedy

Of the four alternatives evaluated to remediate the remaining contamination at the Site, EPA has selected Alternative RHP S-4, Sediment Removal and Disposal in a Subtitle D Landfill. Based on the findings in the RI/FS and Technical Memorandum Numbers 1 and 2 and the nine criteria listed in Section J of this Decision Summary, Alternative RHP S-4 represents the best balance among the evaluation criteria. In addition to implementing Alternative 4, EPA will decommission the existing facilities.

Summary of the Rationale for the Selected Remedy

Because the contaminated sediment will be removed and disposed of off-Site:

1. There would be no possible direct contact by ecological receptors or leaching of the contaminants to surface water.
2. There would be no need to perform fish tissue monitoring or five-year reviews (reducing the total present worth costs)
3. There would be no need to implement institutional controls to prevent excavation in the area of contaminated sediment.

Description of the Selected Remedy

The selected remedy consists of removing all of the sediment from Rhinehart's Pond and the sediment exceeding 1,600 mg/kg of zinc from approximately the first 150 feet of Massey Run, dewatering or stabilizing the sediment (if necessary), and disposing of the sediment in a Subtitle

D landfill. Specifically, this alternative for sediment remediation includes the following components:

- Remove the surface water from Rhinehart's Pond and treat to the existing NPDES discharge requirements prior to discharge to Massey Run;
- Remove all of the sediment (approximately 1,000 cubic yards) from Rhinehart's Pond;
- Cover excavated area with appropriate material suitable for sustaining an aquatic habitat if the dam is left in place or sustaining a stream channel and bank if the dam is removed;
- Remove the sediment which exceeds 1,600 mg/kg of zinc (approximately 15 cubic yards) from Massey Run;
- Place clean sediment in excavated area of Massey Run;
- De-water/stabilize the excavated sediment (if necessary) and treat the excess water (either in the on-Site treatment plant or at an off-Site facility) to the applicable NPDES discharge requirements prior to discharge; and
- Dispose of sediment in a Subtitle D landfill;

In addition, as part of the selected remedy, EPA will also decommission the existing facilities. Specifically, this work includes the following components:

- Conduct an evaluation during the remedial design to determine whether to remove the shotcrete from the face of the slopes or leave it in place; if removed, the shotcrete will either be disposed of off-Site or used as fill on the Site;
- Remove the dam on Rhinehart's Pond. The material from the dam will be used as backfill only if it does not exceed the RBCs or local background levels, whichever one is greater; the concrete portions of the dam may also be backfilled on-Site; [2]
- Re-grade and re-vegetate the face of the slopes and the benches; the pile of fill material which is presently staged on the property will be used as backfill on the Site only if it does not exceed the RBCs or local background levels, whichever one is greater;
- Abandon the existing subsurface drainage system, in accordance with generally accepted engineering practices;
- Abandon the existing monitoring wells installed for the RI in accordance with generally accepted engineering practices;

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[2]EPA may decide to leave the dam intact if, by the completion of remedial design, Frederick County or some other entity obtains possession of the dam and of the land on which the dam and pond are located and agrees to maintain the dam and pond. If EPA decides to revise the remedy to leave the dam intact, this decision will be implemented in accordance with the procedures contained in the NCP.

- Remove and properly dispose of the oil/water separator, water treatment plant and the Site fence;
- Re-channel the stream where Rhinehart's Pond was;
- Re-grade and re-vegetate the remaining portions of the Site.

EPA will comply with all Federal, State, and local laws for all activities occurring off-Site. With respect to the off-Site disposal of the sediment, these include 9 VAC 20-80-630, which requires that permission be obtained from the Director of VDEQ before such special wastes are received ands disposed of at a solid waste management facility in Virginia. VDEQ has informed EPA that such permission should be sought through the VDEQ office for the area where the disposal facility is located.

EPA may modify or refine the selected remedy during the remedial design and construction. Such modifications or refinements, if any, would generally reflect results of the engineering design process.

Summary of the Estimated Remedy Costs

The detailed cost estimate of Alternative 4 is included in Table 16. The detailed cost estimate of decommissioning the existing facilities is included in Table 17. The information in the cost estimate summaries are based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements, are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD Amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Expected Outcomes of the Selected Remedy

As a result of implementing the selected remedy, ecological receptors in Massey Run will no longer be exposed to levels of zinc in the stream sediment which could cause adverse effects, i.e. 1,600 mg/kg, because all of the sediment exceeding 1,600 mg/kg zinc will be removed and disposed of off-Site. Potential human health risks associated with ingestion of fish contaminated with thallium and zinc will be addressed because treating all of the surface water in Rhinehart's Pond prior to sediment removal will remove the thallium in the pond water and sediment contaminated with zinc will be removed and disposed of in an off-Site landfill.

The selected remedy for OU3 of this Site does not include restrictions on the use of the land or the ground water. The time to perform the remedial action, including decommissioning of the existing facilities, will be approximately four to six months.

M. Statutory Determinations

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with all ARARs (unless a statutory waiver is justified), are cost -effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility or volume of hazardous wastes as a principal element and a bias against off-Site disposal. The following sections discuss how the selected remedy (Alternative RHP S-4, Removal of Contaminated Sediment and Disposal at a Subtitle D landfill) for OU3 of the Site meets these statutory requirements.

1.) Protection of Human Health and the Environment

The selected remedy would attain RAOs for the Site. Ecological receptors in Massey Run will no longer be exposed to levels of zinc in the stream sediment which could cause adverse effects, i.e. 1,600 mg/kg, because all of the sediment exceeding 1,600 mg/kg zinc will be removed and disposed of off-Site. Potential human health risks associated with ingestion of fish contaminated with thallium and zinc will be eliminated because treating all of the surface water in Rhinehart's Pond prior to sediment removal will remove the thallium in the pond water and pond sediment contaminated with zinc will be removed and disposed of in an off-Site landfill.

2.) Compliance with Applicable or Relevant and Appropriate Requirements

This is the final selected remedy for the Site. All ARARs have been or will be met by implementation of these response actions.

NCP 40 C.F.R. §300.430(f)(5)(ii)(B) and (C) require that a ROD:

- Describe the Federal and State ARARs that the remedy will attain; and
- Describe the Federal and State ARARs that the remedy will not meet, the waiver invoked, and the justification for invoking the waiver.

The following lists and briefly describes the ARARs that the selected remedy will attain (unless stated otherwise, the ARARs are applicable):

The Federal Migratory Bird Treaty Act of 1972, 16 USC §703, protects designated species of birds. The substantive standards of this act will be met with respect to any migratory birds identified at the Site.

The Federal Fish and Wildlife Coordination Act, 16 USC §662, requires Federal agencies involved in actions that will result in diversion, channeling, control, or modification in a stream or other water body to take action to protect fish and wildlife resources which may be affected by the action. EPA has already consulted with the U.S. Fish and Wildlife Service. We will continue to coordinate with them during the design and construction phases.

The Federal Wetlands Regulations, 40 C.F.R. §6.302(a) and Appendix A, §6(a)(1), (3), (5), are determined as To Be Considered. These regulations require that no activity that adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be minimized and/or mitigated. A wetland delineation has not yet been performed at the Site. The substantive requirements of this regulation will be incorporated into the response actions at the Site, to minimize the destruction, loss or degradation of any wetlands present.

The Virginia Wetlands Policy, 9 VAC 25-380-10, et seq., requires minimizing alteration in the quantity or quality of the natural flow of water that nourishes wetlands. The Virginia Wetlands Act, Code of Virginia, §28.2-1300 et seq., the Virginia Wetlands Mitigation Compensation Policy, 4 VAC 20-390-10, et seq., require that wetlands of primary ecological significance must not be altered so that ecological systems in the wetlands are unreasonably disturbed. The Virginia Water Resources Policy, 9VAC 25-390-10 et seq., requires protection of wetlands. A wetlands delineation has not yet been performed at the Site. The substantive requirements of this regulation will be incorporated into the response actions at the Site, to minimize the destruction, loss or degradation of any wetlands present.

The Virginia Air Pollution Control Regulations: Part V (New and Modified Sources) Rule 5.1 Visible Emissions and Fugitive Dust Emissions, 9 VAC 5-50-60 through 9 VAC 5-50-120, sets standards for visible emissions and fugitive dust emissions. The substantive requirements of these regulations will be met by the remedial action.

The Virginia Water Quality Standards, 9 VAC 25-260-5, et seq., sets State standards to protect in-stream beneficial uses. State water quality standards apply to the discharge of the surface water in Rhinehart's Pond which will be treated prior to discharge to Massey Run. These standards are also relevant and appropriate as in-situ cleanup standards for Massey Run.

The Federal Clean Water Act 33 USC §§ 1251 et seq., 40 CFR §122.44-45, 122.41(a), (d), (e), (j)(1), (m)(1), (m)(4): 125-100-104 sets discharge limits for point source discharges. Treatment system effluent of the surface water in Rhinehart's Pond will be generated under the selected remedy. Discharge limits shall be met for this discharge.

The Clean Water Act: Federal Ambient Water Quality Criteria for the Protection of Aquatic Life, 33 U.S.C. §1314, are relevant and appropriate. These are non-enforceable guidelines established pursuant to Section 304 of the Clean Water Act that set the concentrations of pollutants which are considered adequate to protect human health based on water and fish ingestion and to protect aquatic life. Those criteria which deal with fish ingestion and protection of aquatic life are relevant and appropriate to Massey Run unless a State Water Quality Standard exists for that substance.

The Virginia Stormwater Management Regulations, 4 VAC 3-20-10; 4 VAC 3-20-60A, B, C, C (except requirement RE: permit), D, E, F, G, K and L; 4 VAC 3-20-71; 4 VAC 3-20-81A; 4 VAC 3-20-85 A, B and C, inhibits deterioration of existing waterways by requiring that post development stormwater runoff characteristics, including water quality and quantity, are maintained, to the extent practicable, equal to or better than pre-development runoff characteristics. This regulation is applicable for “land development projects” undertaken as part of a removal or remedial action. The remedial action will meet the substantive requirements of these regulations.

The Virginia Erosion and Sediment Control Regulations, 4 VAC 50-30-40; 4 VAC 50-30-60A, establishes minimum standards for the control of soil erosion, sediment deposition, and runoff, and requires maintenance, inspection and repair of erosion and sediment control structures and systems. These regulations apply to land change which may result in soil erosion from water or wind and the movement of sediments into state waters or onto state lands. The remedial action shall comply with the substantive standards of these requirements.

The Solid Waste Management Regulations: Conditional Exemptions, 9 VAC 20-80-60 D.4 and 5, establishes criteria for conditional exemptions from remainder of regulations governing management or disposal of solid wastes. To comply with these regulations, all solid waste at the Site will either (1) be stored in appropriate containers and collected for disposal within required timeframes; and/or (2) landfilled if it consists of only rocks, bricks, block, dirt, broken concrete and road pavement, and contains no paper, yard or wood wastes.

3.) Cost-Effectiveness

The selected remedy (sediment removal and off-Site disposal) is cost-effective because it mitigates the risks posed by the Site contamination within a reasonable period of time. Section 300.430(f)(1)(ii)(D) of the NCP requires EPA to evaluate cost-effectiveness by first determining if the alternative satisfies the threshold criteria: protection of human health and the environment and compliance with ARARs. The effectiveness of the alternative is then determined by evaluating the following three of the five balancing criteria: long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. The selected remedy meets these criteria and is cost-effective because the costs are proportional to its overall effectiveness. This is shown on the following table:

TABLE 18 Matrix of Cost and Effectiveness Data Rhinehart Tire Fire OU3					
Relevant Considerations for Cost-Effectiveness Determination:					
Alternative	**Present Worth Cost**	**Incremental Cost**	**Long-Term Effectiveness and Permanence**	**Reduction of Toxicity, Mobility, or Volume Through Treatment**	**Short-Term Effectiveness**
1) No Action	$52,000	-----	• No reduction in long-term risk to human health and the environment	• No reduction of toxicity • No reduction of mobility • No reduction of volume	• No short-term risk to workers • No short-term risk to community • No short-term impact on environment
2) Limited Action	$400,000	$348,000	• Limited reduction in long-term risk to human health and the environment	• No reduction of toxicity • No reduction of mobility • No reduction of volume	• 2 months to implement • No short-term risk to workers • No short-term risk to community • No short-term impact on environment
4) Sediment Removal & Disposal	$658,000	$258,000	• Highest degree of long-term effectiveness and permanence because sediment is removed and disposed of off-site	• No reduction of toxicity • No reduction of mobility • No reduction of volume	• 4 months to implement • RAOs achieved in 4 months • No short-term risk to workers • No short-term risk to community
3) Capping	$835,000	$177,000	• Long-term effectiveness is dependent on adequacy of monitoring program	• No reduction of toxicity • No reduction of mobility • No reduction of volume	• 3 months to implement • No short-term risk to workers • No short-term risk to community

4) Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable (MEP)

This section describes the rationale used by EPA in selecting Alternative RHP S-4, Sediment Removal and Disposal in a Subtitle D Landfill, to remediate the Site. This discussion explains how the selected remedy provides the best balance of trade-offs among the alternatives considered with respect to the balancing criteria set out in NCP §300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanence and treatment can be practicably utilized at this Site. NCP §300.430(f)(1)(ii)(E) provides that the balancing shall emphasize the factors of "long-term effectiveness" and "reduction of toxicity, mobility or volume through treatment," and shall consider the preference for treatment and bias against off-Site disposal. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and considering state and community acceptance.

Regarding long-term effectiveness and permanence, the selected remedy ranks highest among the four alternatives evaluated. It is the only alternative which does not require long-term maintenance and monitoring. It is also the only alternative which achieves the RAOs established for this Site. Alternative RHP S-1, No Action, will not be effective over the long-term because this alternative leaves the Site in its existing state. Alternative RHP S-2, Limited Action, may be effective over the long-term in reducing contaminant exposure to ecological receptors but it does not address migration of contamination. Alternative RHP S-3, Capping, may be effective over the long-term but it will require maintenance in the form of monitoring the depth of the clean sediment cap to ensure that contaminated sediment are not exposed to surface water or other receptors. As such, Alternative RHP S-4 represents the maximum extent to which permanent solutions are practicable at this Site.

Regarding reduction of toxicity, mobility or volume through treatment, none of the alternatives include treatment of the sediment. TCLP testing in May 2000 has shown the sediment to be non-hazardous. This, combined with the low amount of sediment involved (approximately 1,015 cubic yards total), makes treatment of the sediment not practicable.

Regarding short-term effectiveness, Alternatives RHP S-1 and S-2 do not have short-term impacts to workers, the community, or the environment because they do not include any disruptive construction. Alternatives RHP S-3 and RHP S-4 impact the environment during the three to four months, respectively, while the work takes place but they do not impact the community or workers. Any short-term adverse effects can be easily mitigated.

Regarding implementability, all of the alternatives are technically feasible. Alternative RHP S-1 calls for no change to the existing Site conditions. Alternative RHP S-2 involves simple fencing and installation of bird netting, all of which could be performed with general construction measures. Alternative RHP S-3 would require dewatering. Surface water would be diverted to the on-Site water treatment plant, and temporary holding tanks could be brought on-Site to hold additional pond water, if necessary. Clean fill for the cap would be transported to the Site and stored at a staging area established for fill and equipment. In order to remove the sediment for Alternative RHP S-4, Rhinehart's Pond must be dewatered using the same techniques described above. A drying bed would be constructed to remove the excess water from the excavated sediment. The sediment would be disposed of at an off-Site Subtitle D landfill. Clean fill may be used to line the section of Massey Run after the sediments are removed. Clean soil for Alternatives RHP S-3 and RHP S-4 can be transported to the Site and stored at a staging area established for fill and equipment.

Although each sediment alternative evaluated is administratively feasible, Alternative RHP S-4 would be the easiest to implement administratively. Under Alternatives RHP S-2 and RHP S-3, contaminated sediment would remain on-Site, requiring a Site review every five years. Institutional controls would also be required for these two alternatives to limit future land uses on the Site. Alternative RHP S-4 would require Site access restrictions only until the sediment removal has taken place.

None of the alternatives require special materials or services. Fencing materials for Alternative RHP S-2 are readily available and can be installed using common construction practices. Bird netting can be attained from specialty distributors. Standard earthmoving and construction equipment would be used for Alternatives RHP S-3 and RHP S-4. Clean soil or sediment are available locally to install a sediment cap over contaminated soil.

Regarding cost, the present worth cost of the selected remedy ($658,000) is more than the present worth cost of Alternative RHP S-2 ($400,000) but less than the present worth cost of Alternative RHP S-3 ($835,000).

In summary, the selected remedy was chosen to remediate the Site because it is protective of human health and the environment, complies with all ARARs, and is cost-effective. The criterion which was most decisive in the selection decision is long-term effectiveness and permanence.

5) Preference for Treatment as a Principal Element

Because the contaminants of concern for the sediment are inorganics, in-situ treatment is not feasible. The low amount of sediment involved (approximately 1,015 cubic yards total) also makes on-Site treatment of the sediment not practicable. Also, as stated previously, TCLP testing in May 2000 has shown the sediment to be non-hazardous. As such, off-Site disposal does not require prior treatment.

6) Five-Year Review Requirements

NCP §306.430(f)(4)(ii) requires a review every five years to evaluate whether human health and the environment are being protected by the remedial action being implemented if a remedial action results in hazardous substances, pollutants, or contaminants remaining on-Site above levels that allow for unlimited use or unrestricted exposure. Since there will be no hazardous substances, pollutants, or contaminants remaining at the Site above levels that would allow for unlimited use and unrestricted exposure, EPA does not need to conduct a five-year review of the remedial action at this Site.

N. Documentation of Significant Changes

The Proposed Plan for the Rhinehart Tire Fire Site was released for public comment in August 2000. The Proposed Plan identified Alternative RHP S-4, Sediment Removal and Disposal in a Subtitle D Landfill, as the Preferred Alternative for sediment remediation. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

SOURCE: USGS 7.5 MINUTE QUADRANGLE MAP
(HAYFIELD, VIRGINIA)

0 12000 24000 36000
Scale In Feet

Figure 1
Location of Rhinehart Tire Fire Site

CH2MHILL

29-OCT-1997 49761001.dgn

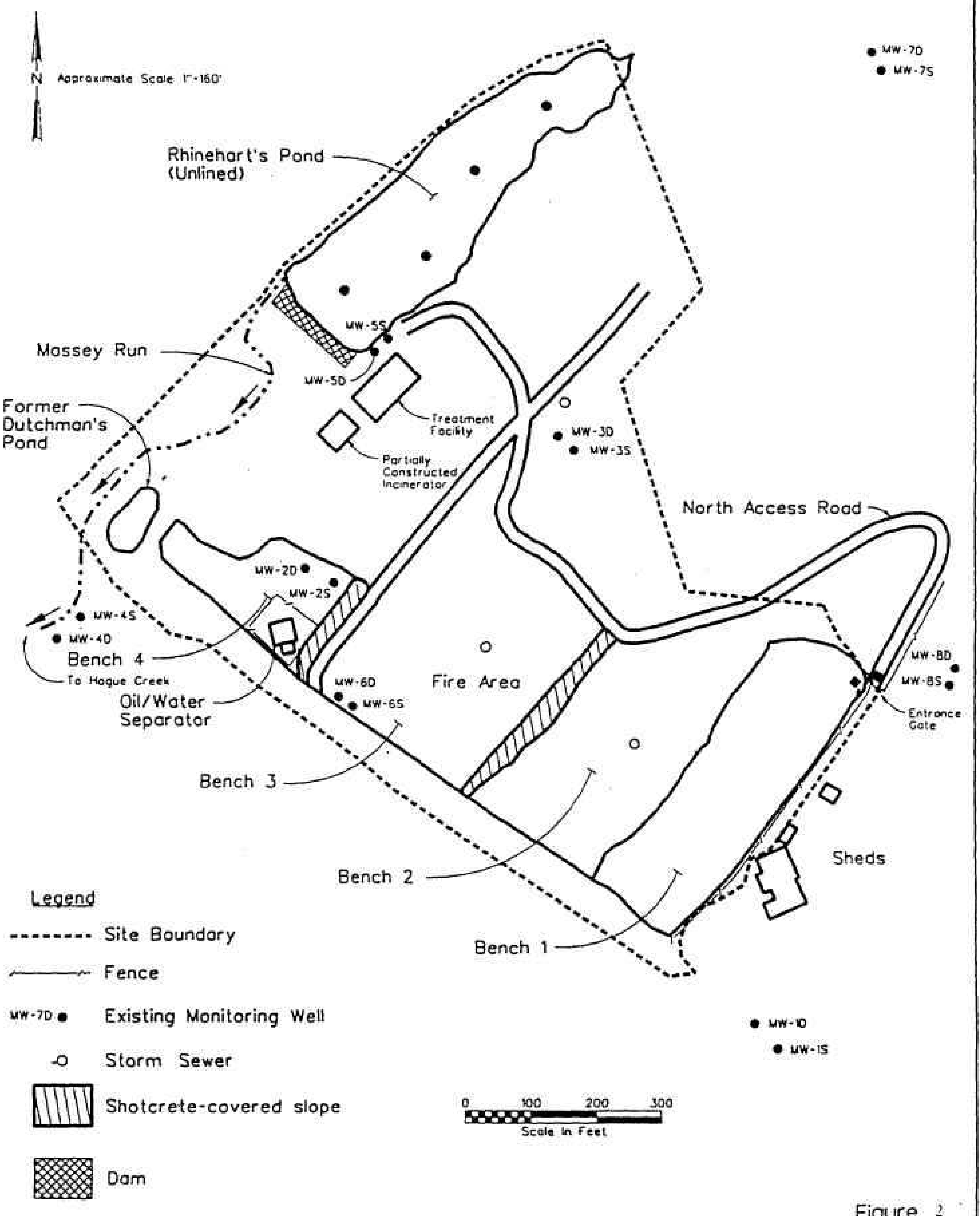

Figure 2
Common Site
Feature Location
Rhinehart Tire Fire Site

CH2MHILL

26-JUL-2000 4976104a.dgn

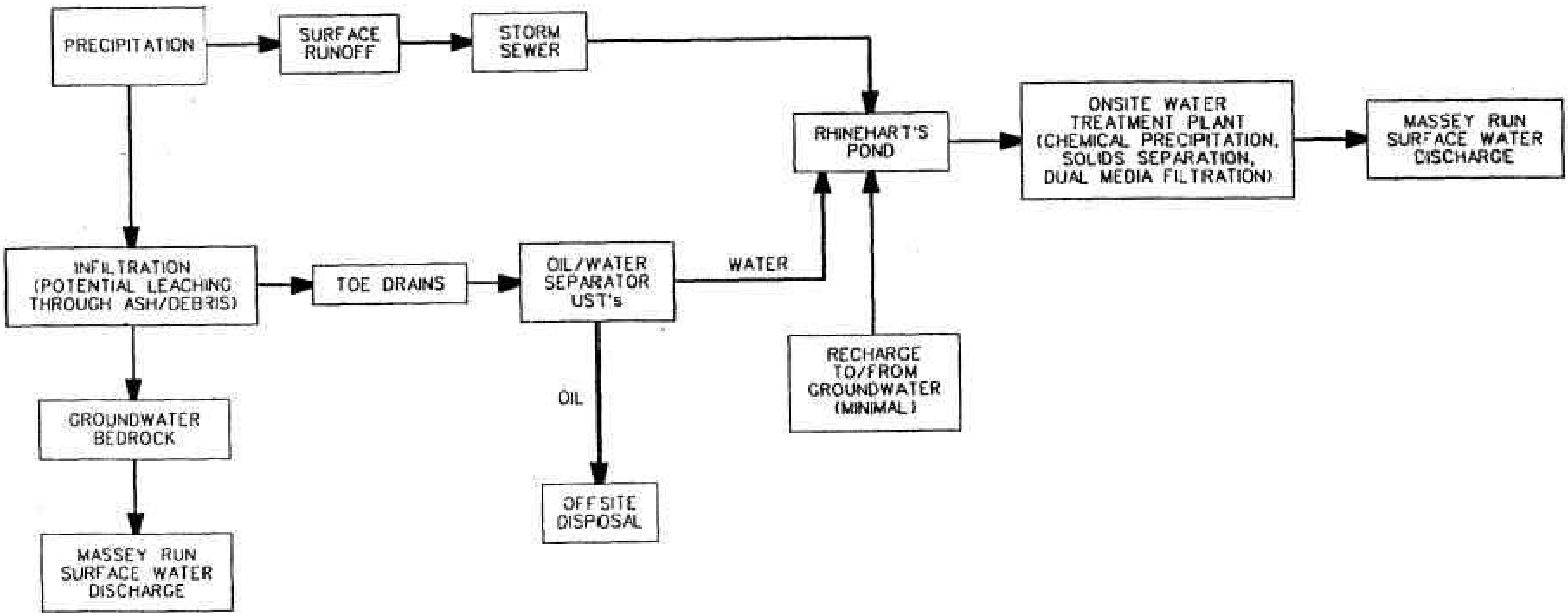

Figure 3
Water Flow Path
Rhinehart Tire Fire Site

CH2MHILL

26-FEB-1998 49761035.dgn

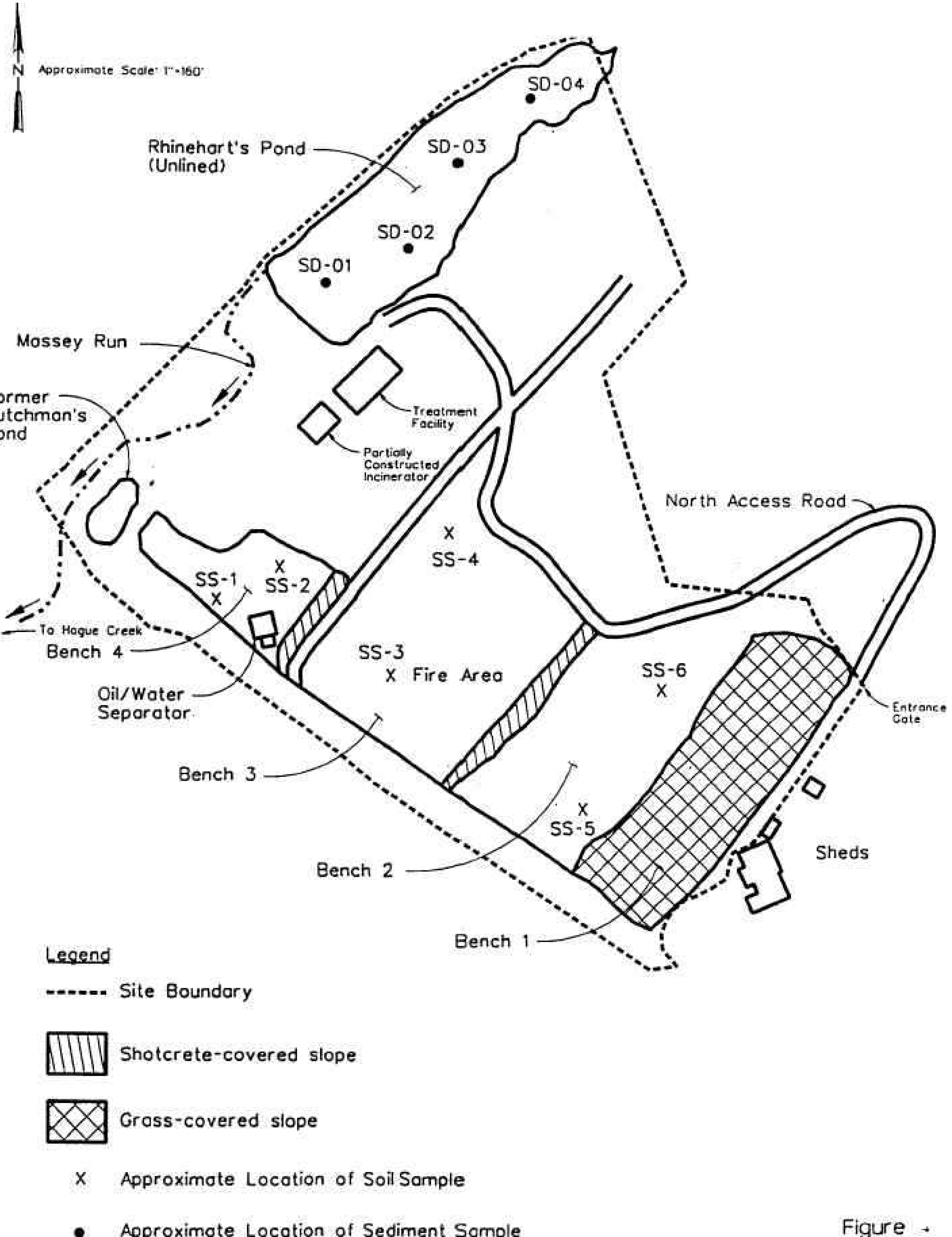

Figure -
Soil and Sediment Sampling Locations
Rhinehart Tire Fire Site

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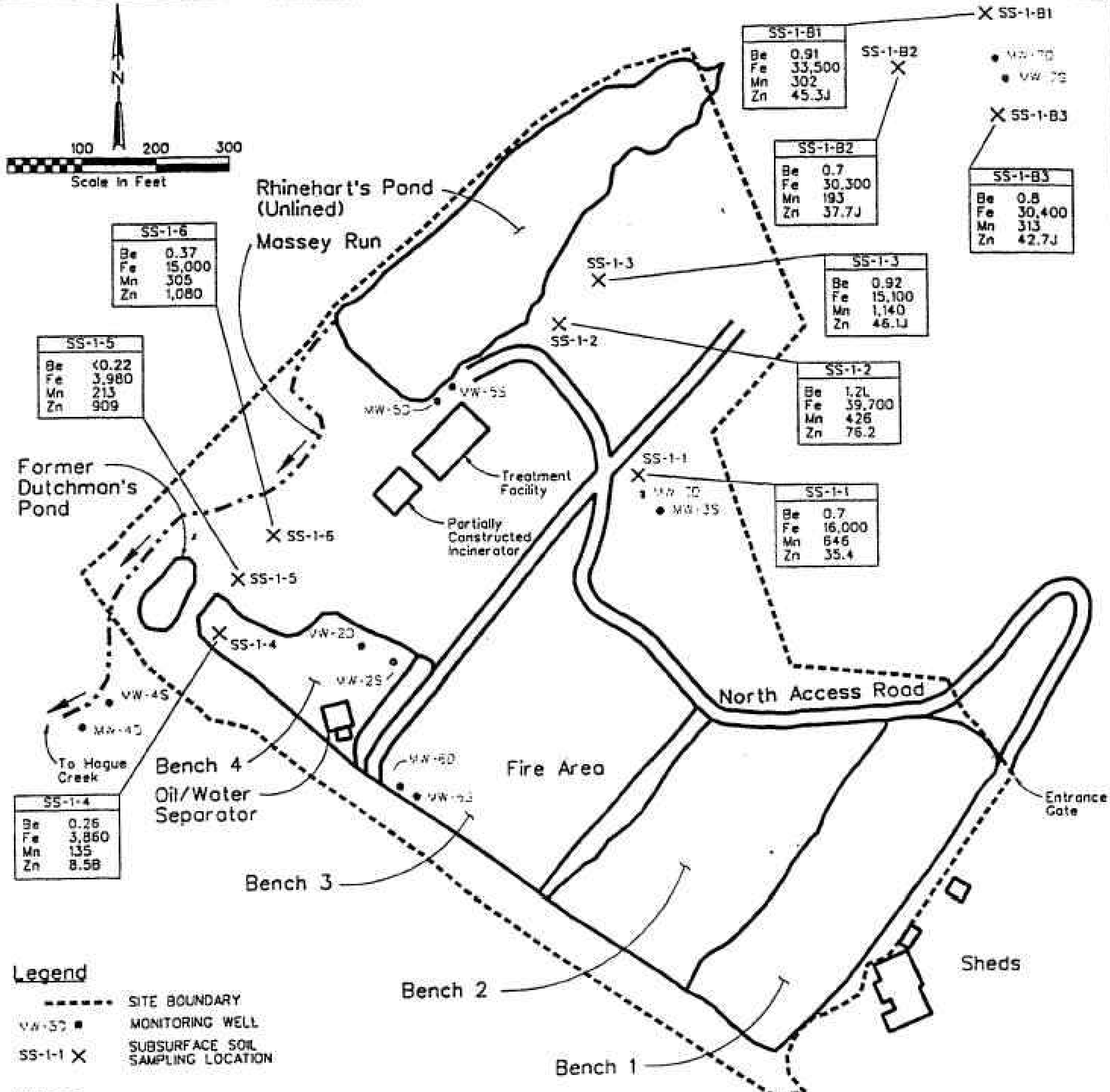
26-JUL-2000 49761002.dgn



Notes:

1. ALL CONCENTRATIONS ARE IN mg/kg. ALL SAMPLES WERE COLLECTED FROM 0 TO 6 INCHES BELOW GROUND SURFACE.
2. AT SAMPLING LOCATIONS WHERE A DUPLICATE WAS COLLECTED IN ADDITION TO A REGULAR SAMPLE, THE HIGHEST CONCENTRATION DETECTED IN THE TWO SAMPLES IS SHOWN.
3. B- CHEMICAL NOT DETECTED SUBSTANTIALLY ABOVE THE LEVEL FOUND IN ASSOCIATED LABORATORY OR FIELD BLANK.

   J- ESTIMATED VALUE; MEASURED VALUE IS LESS THAN QUANTITATIVE DETECTION LIMIT.

   L- BIASED LOW. ACTUAL VALUE MAY BE LOWER THAN REPORTED.

   * pH DEPENDENT

(1) EPA REGION III RBCs FOR TAP WATER (EPA, OCTOBER 1997)

(2) EPA REGION III BTAG SCREENING LEVELS (EPA, AUGUST 1995)

		RBC LEVEL (1)	BTAG VALUE (2)
Be	Beryllium	0.15	0.02*
Fe	Iron	2,300	12
Mn	Manganese	180	330
Zn	Zinc	2,300	10*

Figure 5
Select Detected Inorganics
in Surface-Soil Samples
Rhinehart Tire Fire Site

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19-DEC-1997 49761013.dgn

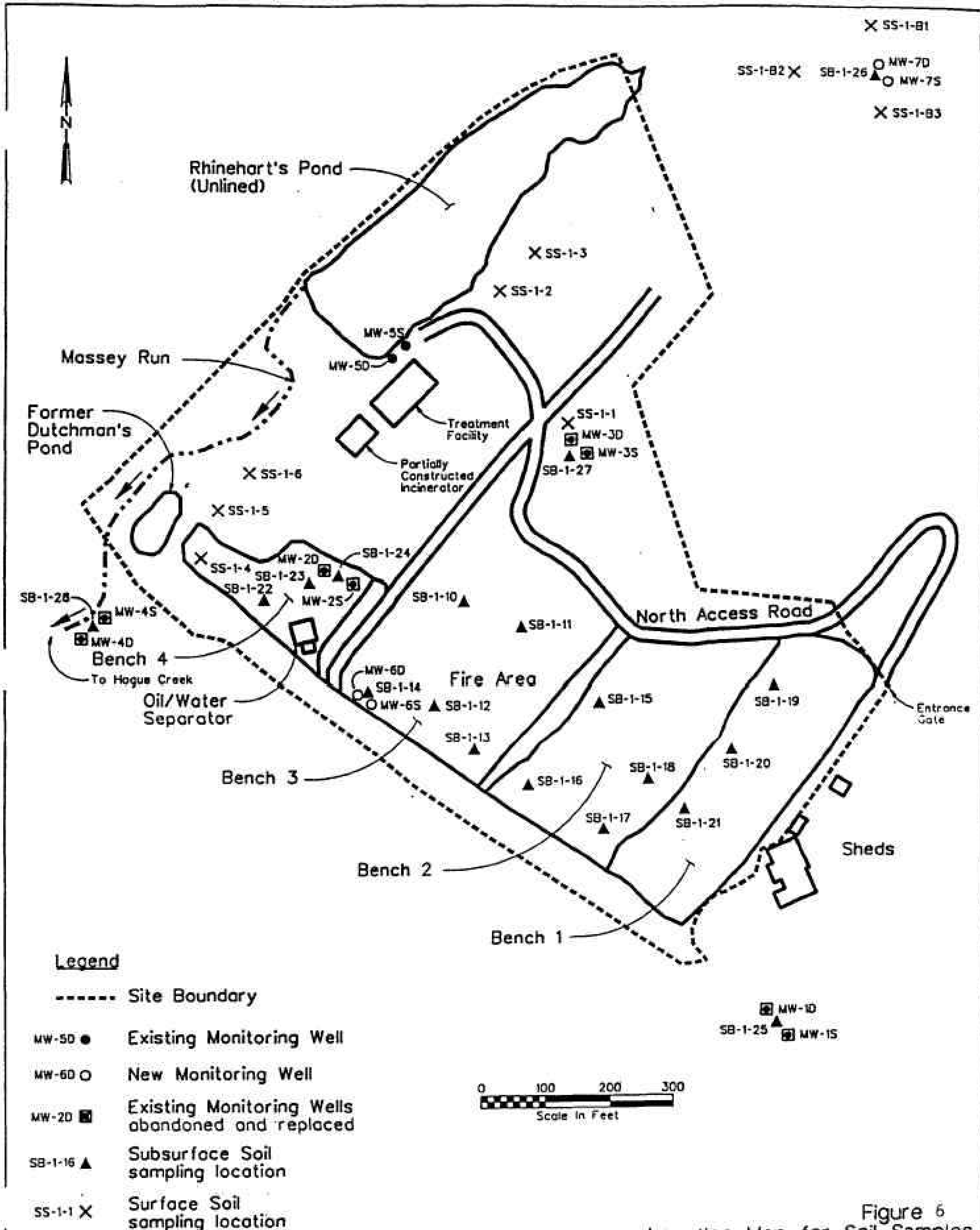

Figure 6
Location Map for Soil Samples
Rhinehart Tire Fire Site

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29-OCT-1997 49761003.dgn

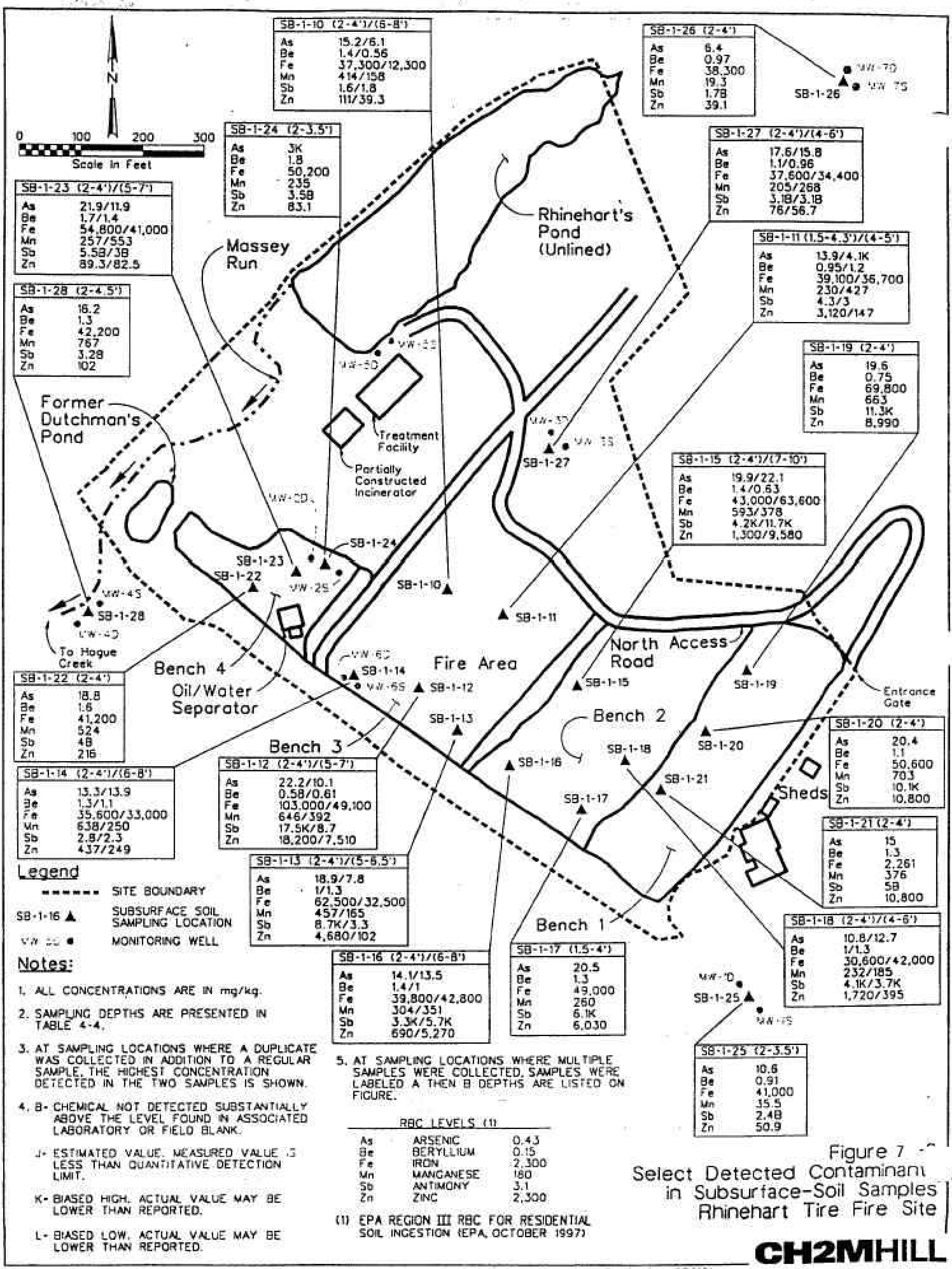
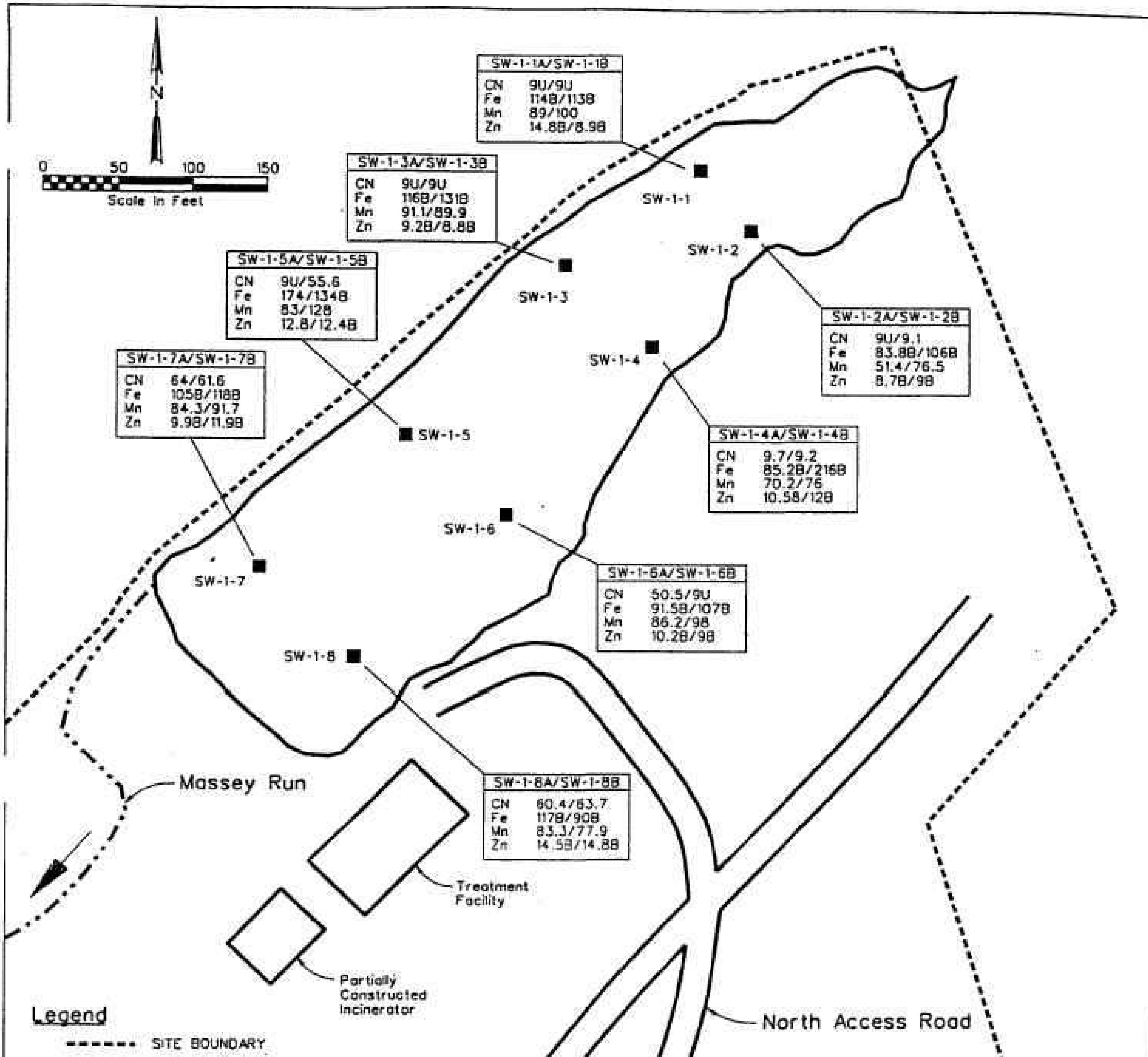


Figure 7-?
Select Detected Contaminants in Subsurface-Soil Samples
Rhinehart Tire Fire Site



Legend

- - - - - - SITE BOUNDARY

SW-1-9 ■ SURFACE WATER SAMPLING LOCATION

Notes:

1. ALL CONCENTRATIONS ARE IN ug/L.
2. TWO SAMPLES WERE COLLECTED FROM EACH SAMPLING LOCATION: THE FIRST FROM 0.5 FEET BELOW THE WATER SURFACE (DESIGNATED A) AND THE SECOND TAKEN AT MID-DEPTH OF THE POND (DESIGNATED B).
3. AT SAMPLING LOCATIONS WHERE A DUPLICATE SAMPLE WAS COLLECTED IN ADDITION TO A REGULAR SAMPLE, THE HIGHEST CONCENTRATION DETECTED IN THE TWO SAMPLES IS SHOWN.
4. QUALIFIER SYMBOLS FOR DATA INCLUDE:

   B- CHEMICAL NOT DETECTED SUBSTANTIALLY ABOVE THE LEVEL FOUND IN ASSOCIATED LABORATORY OR FIELD BLANK.

   U- NOT DETECTED ABOVE QUANTITATION LIMIT.

   * pH DEPENDENT

(1) EPA REGION III RBCs FOR TAP WATER (EPA, OCTOBER 1997)

(2) EPA REGION III BTAG SCREENING LEVELS (EPA, AUGUST 1995)

		RBC LEVEL (1)	BTAG VALUE (2)
CN	Cyanide	73	5.2
Fe	Iron	1,100	320
Mn	Manganese	84	14,500*
Zn	Zinc	1,100	110

Figure 8
Select Detected Inorganics in Surface Water Samples from Rhinehart's Pond
Rhinehart Tire Fire Site

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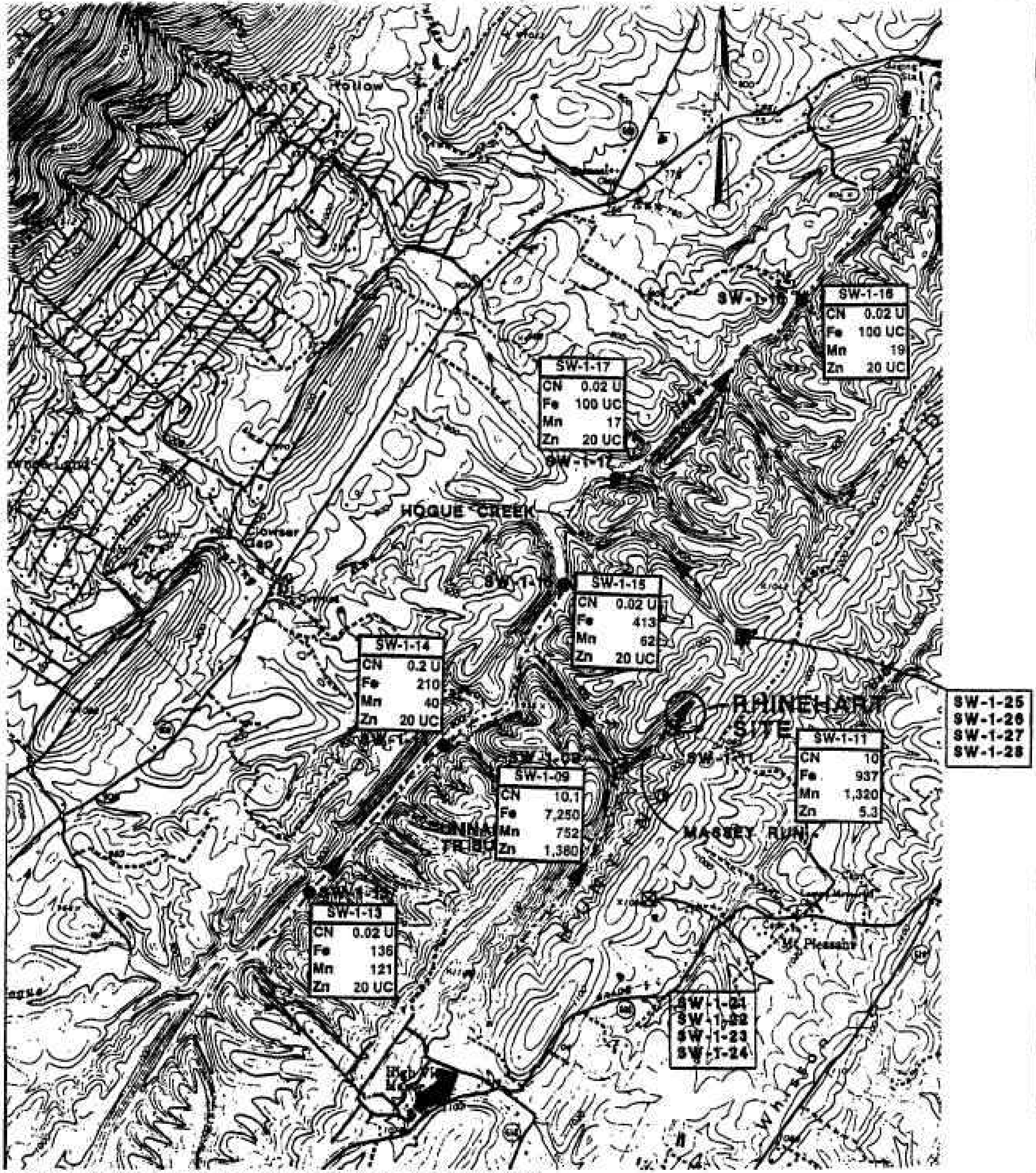
19-DEC-1997 49761015.dgn



SOURCE: USGS 7.5 MINUTE QUADRANGLE MAP (HAYFIELD, VIRGINIA)

0 20000 40000 60000

Scale in Feet

Legend

SW-1-13 ● SURFACE WATER SAMPLING LOCATION

Notes:

1. ALL CONCENTRATIONS ARE IN ug/L
2. AT SAMPLING LOCATIONS WHERE A DUPLICATE WAS COLLECTED IN ADDITION TO A REGULAR SAMPLE, THE HIGHEST CONCENTRATION DETECTED IN THE TWO SAMPLES IS SHOWN.
3. QUALIFIER SYMBOLS FOR DATA INCLUDE:

   C- SAMPLE REQUIRED ADDITIONAL PRESERVATION BY LABORATORY UPON RECEIPT.

   U- NOT DETECTED. NUMBER INDICATES APPROXIMATE CONCENTRATION TO BE DETECTED.

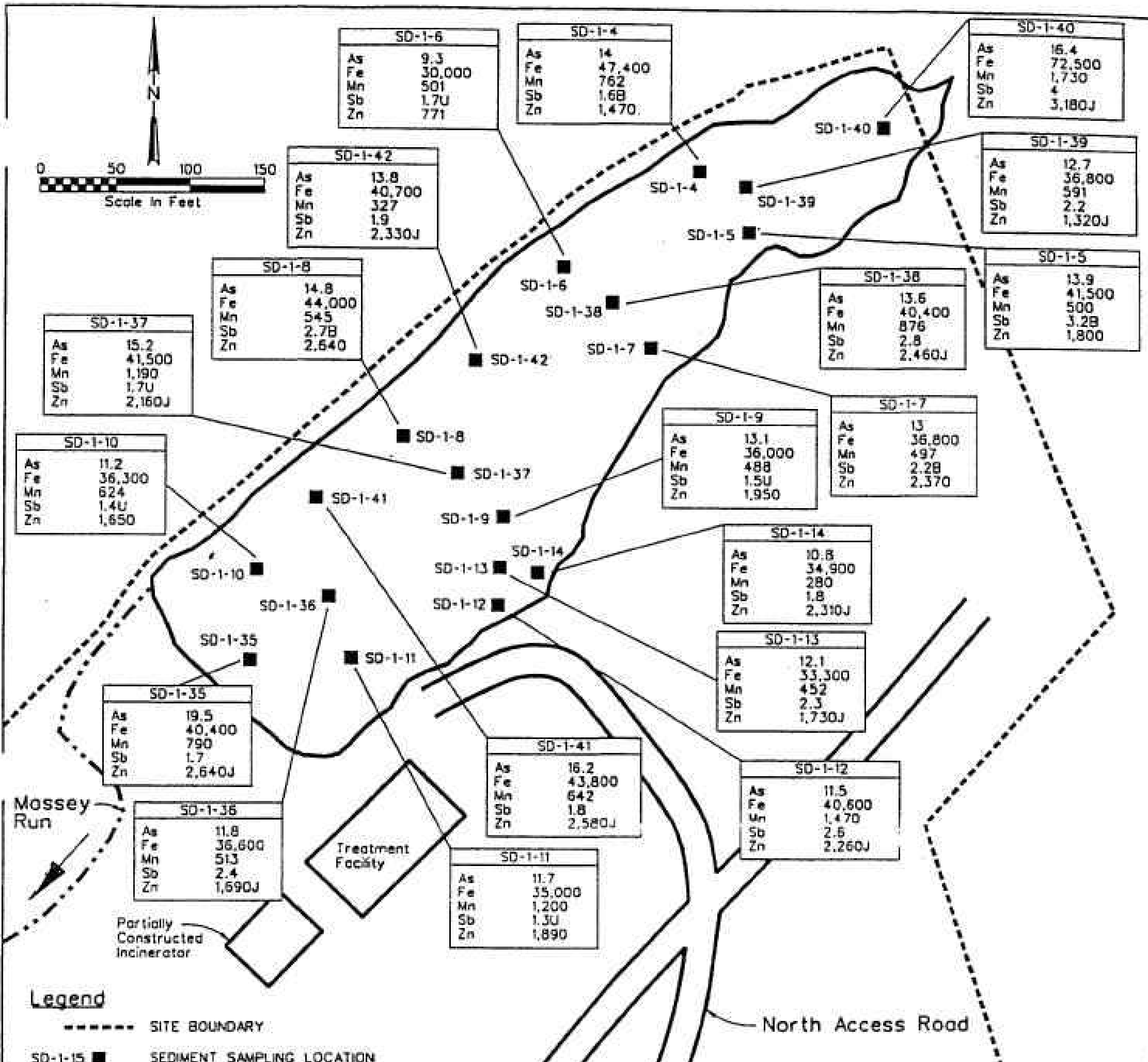
   × pH DEPENDENT

(1) EPA REGION III RBCs FOR TAP WATER (EPA, OCTOBER 1997)

(2) EPA REGION III BTAG SCREENING LEVELS (EPA, AUGUST 1995)

		RBC LEVEL (1)	BTAG SCREENING (2)
Cn	Cyanide	73	5.2
Fe	Iron	1,100	320
Mn	Manganese	84	14,500×
Zn	Zinc	1,100	110

Figure 9
Select Detected Inorganics in Surface-water Samples from Streams
Rhinehart Tire Fire Site



Notes:

1. ALL INORGANIC CONCENTRATIONS ARE IN mg/kg.
2. ALL SAMPLES WERE COLLECTED FROM THE TOP SIX INCHES OF SEDIMENT IN RHINEHART'S POND.
3. AT SAMPLING LOCATIONS WHERE A DUPLICATE SAMPLE WAS COLLECTED IN ADDITION TO A REGULAR SAMPLE, THE HIGHEST CONCENTRATION DETECTED IN THE TWO SAMPLES IS SHOWN.
4. QUALIFIER SYMBOLS FOR DATA INCLUDE:
   - B- CHEMICAL NOT DETECTED SUBSTANTIALLY ABOVE THE LEVEL FOUND IN ASSOCIATED LABORATORY OR FIELD BLANK.
   - J- ESTIMATED VALUE. MEASURED VALUE IS LESS THAN QUANTITATIVE DETECTION LIMIT.
   - U- NOT DETECTED. QUANTITATION LIMIT IS ESTIMATED.
   - x pH DEPENDENT

(1) EPA REGION III RBCs FOR RESIDENTIAL SOIL INGESTION (EPA, OCTOBER 1997)

(2) EPA REGION III BTAG SCREENING LEVELS (EPA, AUGUST 1995)

		RBC LEVEL (1)	BTAG VALUE (2)
As	Arsenic	0.43	328
Fe	Iron	2,300	12
Mn	Manganese	180	330
Sb	Antimony	3.1	0.48
Zn	Zinc	2,300	10 x

Figure 10
Select Detected Inorganics in Sediment Samples from Rhinehart's Pond
Rhinehart Tire Fire Site

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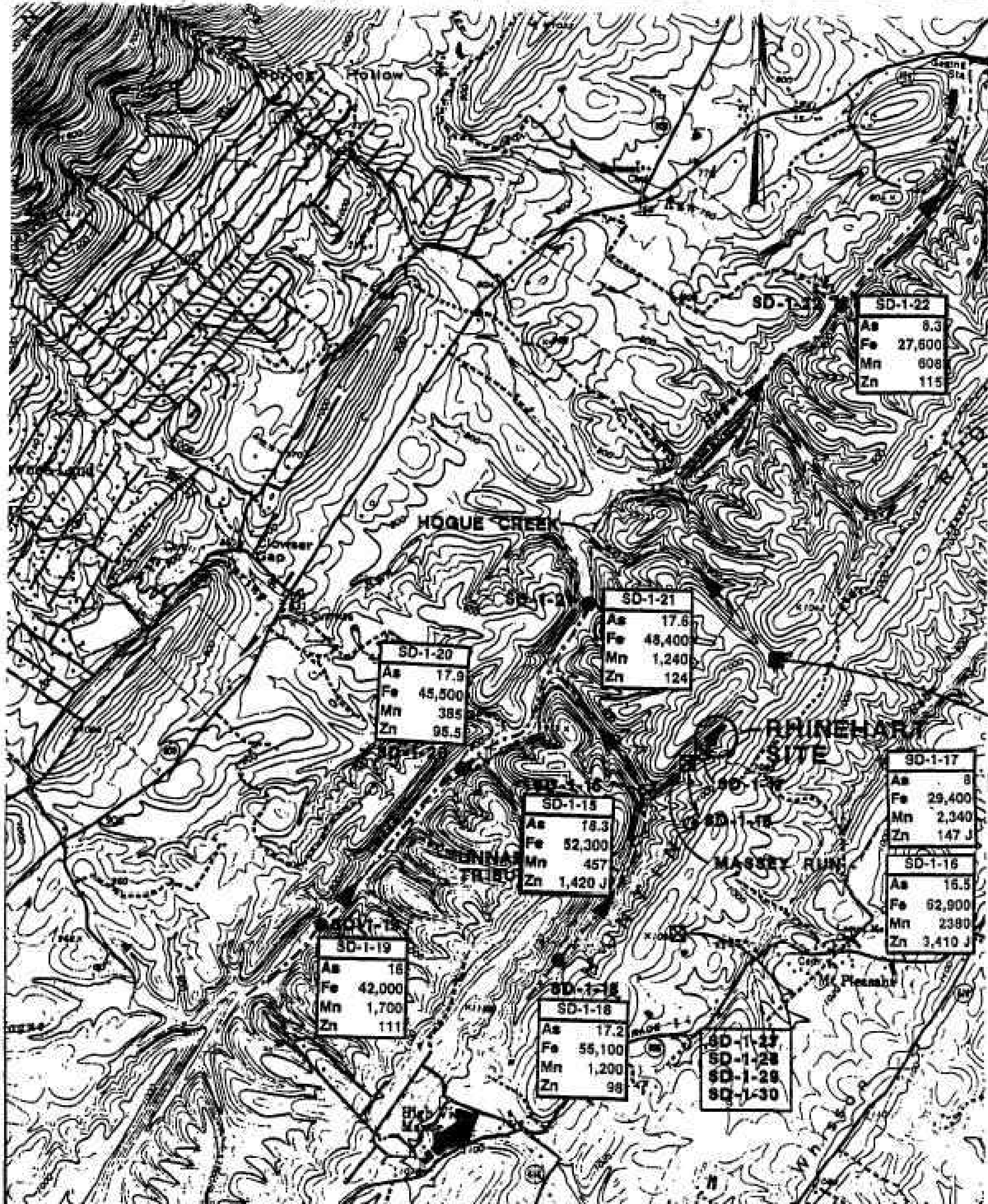
19-DEC-1997 49761016.dgn



SOURCE: USGS 7.5 MINUTE QUADRANGLE MAP (HAYFIELD, VIRGINIA)

0 20000 40000 60000

Scale in Feet

Legend

SD-1-19 ● SEDIMENT SAMPLING LOCATION

Notes:

1. ALL CONCENTRATIONS ARE IN mg/kg.
2. AT SAMPLING LOCATIONS WHERE A DUPLICATE WAS COLLECTED IN ADDITION TO A REGULAR SAMPLE, THE HIGHEST CONCENTRATION DETECTED IN THE TWO SAMPLES IS SHOWN.
3. QUALIFIER SYMBOLS FOR DATA INCLUDE:

   J- ESTIMATED VALUE. MEASURED VALUE IS LESS THAN QUANTITATIVE DETECTION LIMIT.

   x pH DEPENDENT

(1) EPA REGION III RBCs FOR RESIDENTIAL SOIL INGESTION (EPA, OCTOBER 1997)

		RBC LEVEL (1)	BTAG VALUE (2)
As	Arsenic	0.43	328
Fe	Iron	2,300	12
Mn	Manganese	180	330
Zn	Zinc	2,300	10 x

Figure 11
Select Detected Inorganics in Sediment Samples from Streams
Rhinehart Tire Fire Site

Table 1
Chemicals of Potential Concern Based on Comparison to Ecological Screening Values[1]
Rhinehart Tire Fire Site

Soil	
Surface Soil	
Beryllium	
Chromium	
Copper	
Iron	
Lead	
Manganese	
Nickel	
Zinc	
Surface Water	
Rhinehart's Pond	**Off-Site Streams**
Cyanide	Copper
	Cyanide
	Iron
	Zinc
Sediment	
Rhinehart's Pond	**Off-Site Streams**
Arsenic	Arsenic
Cadmium	Copper
Copper	Nickel
Lead	Zinc
Mercury	Phenanthrene
Nickel	
Selenium	
Zinc	
Benzo(a)anthracene	
Chrysene	
Flouranthene	
Phenanthrene	
Pyrene	
Ethylbenzene	

Note:
[1] Region III BTAG Screening Levels, August 9,1995.

Table 2
Chemicals of Potential Concern Based on Comparison to Human Health Screening Values[1]
Rhinehart Tire Fire Site

Soil	
Surface Soil	**Subsurface Soil**
Aluminum	Aluminum
Arsenic	Antimony
Beryllium	Arsenic
Iron	Beryllium
Manganese	Iron
	Manganese
	Thallium
	Zinc
	Benzo(a)pyrene

Surface Water	
Rhinehart's Pond	**Off-Site Streams**
Manganese	Copper (fish ingestion only)
Thallium	Iron
	Manganese
	Thallium
	Vanadium
	Zinc

Sediment	
Rhinehart's Pond	**Off-Site Streams**
Aluminum	Aluminum
Antimony	Arsenic
Arsenic	Beryllium
Beryllium	Iron
Chromium	Manganese
Iron	Zinc
Manganese	Benzo(a)pyrene
Thallium	
Vanadium	
Zinc	
Benzo(a)anthracene	
Benzo(a)pyrene	

Groundwater
Arsenic
Barium
Iron
Manganese

Note:
[1] Region III Risk-Based Concentration Table, October 22, 1997.

Table 3
SUMMARY OF DETECTED CONSTITUENTS IN SURFACE-SOIL SAMPLES
RHINEHART TIRE FIRE

STATION	COPC	RBC	BTAG	SS-1-1	SS-1-2	SS-1-2*	SS-1-3	SS-1-4	SS-1-5	SS-1-6	SS-1-B1	SS-1-B2	SS-1-B3	Background	
Sampling Location		Conc.	Value	NE of Benches 3 & 4				Surface Seeps			Background			Max. Detected Concentration	Mean Concentration
INORGANICS (MG/KG)															
Aluminum	H	7800	1.0	10300	15200	15100	13200	1610	1660	3720	13400	13500	13100	13500	13333
Antimony		3.1	0.48	1.1 B	1.1 B						1.3	1.6	1.8	1.8	1.6
Arsenic	H	0.43	328	5.7	14.5	13	5.9	1.8 K			11.6	11.6	9.7	11.6	.11
Barium		550	440	112	96.4	88.6	160	27.8	9.4	17	86.7	66.4	80.5	80.5	77.9
Beryllium	H, E	0.15	.02[a]	.7	1.2 L	.97	.92	.26		.37	.91	.7	.8	0.91	0.8
Calcium		N/A	N/A	1490	1740	1880	870	273000	1740	552	1500	1080	1390	1500	1323
Chromium	E	39	0.0075	10.8	22.9	20.3	12	4.8	4.1 B	21.9	20.7	18.2	19.7	20.7	19.5
Cobalt		470	0.1[a]	10.3	12.7	11	13.1	2.2 K	9 K	12.9 K	8.7	.7	10.8	10.8	8.8
Copper	E	310	15	9.4	20	19.5	11.4	4.1	5.5	6.1	17.5	17.2	13.1	17.5	15.9
Iron	H, E	2300	12	16000	39700	33200	15100	3860	3980	15000	33500	30300	30400	33500	31400
Lead	E	400	0.01	17.4	22.1	19.7	21.4	2.4	3.4	7	24.2	19.9	21.6	24.2	21.9
Magnesium		N/A	4400	933	1710	1660	1050	14100	414	696	1040	975	1040	1040	1018
Manganese	H, E	180	330	646	426	322	1140	135	213	305	302	193	313	313	269
Nickel	E	160	2	10.7	23.5	19.3	13.3	3.8	3.6 B	5.4	13.4	12.6	12.6	13.4	12.9
Potassium		N/A	N/A	1050 J	1630 J	1730 J	1180 J	573 J	178 J	341 J	1420 J	1370 J	1320 J	1420	1370
Sodium		N/A	N/A	1526 B	176	187	151	195	70.9	136	148	146	143 B	148	147
Vanadium		55	0.5	19.8	31	29.4	23.5	7.5 K	7.1 K	31.7	27.1	28	30.5	30.5	28.5
Zinc	E	2300	10	35.4	76.2	62.6 J	46.1 J	8.5 B	909	1080	45.3 J	37.7 J	42.7	45.3	41.9
VOLATILE ORGANIC (UG/KG)															
Tetrachlorethene		12000	<300				3 J							3	3
Toluene		1600000	100		1 J		1 J				1 J			1	1

Notes:
COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
BTAG values are from Region III BTAG Screening Levels, 8/9/95.
* Sample is a duplicate of SS-1-2.
Blank cells indicate the sample was below the detection level for that constituent.
A = value is dependant on pH.
B = Chemical not detected substantially above the level found in associated laboratory of field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 4
SUMMARY OF DETECTED INORGANICS IN SUBSURFACE-SOIL SAMPLES
RHINEHART TIRE FIRE

STATION	COPCs	RBC	SB-1-10A	SB-1-10B	SB-1-11A	SB-1-11B	SB-1-12A	SB-1-12B	SB-1-13A	SB-1-13A*	SB-1-13B	SB-1-14A	SB-1-14B
Station Location		**CONC.**		**Bench #3**									
MW Association												**MW-6**	
Depth of Sample (ft bgs)			2 - 4	6 - 8	1.5 - 3.5	4 - 5	2 - 4	5 - 7	2 - 4	2 - 4	5 - 6.5	2 - 4	6 - 8
INORGANICS (MG/KG)													
Aluminum	H	7800	15100	5350	10600	12400	8240	9280	10600	11000	16200	13700	13700
Antimony	H	3.1	1.6	1.8	4.3	3	17.5 K	8.7	7.8	8.7 K	3.3	2.8	2.3
Arsenic	H	0.43	15.2	6.1	13.9	4.1 K	22.2	10.1	18.9	18.7	7.8	13.3	13.9
Barium		550	92.5	60.4	75.1	107	98	60.9	93.3	106	114	116	81.4
Beryllium	H	0.15	1.4	.56	.95	1.2	.58	.61	1	.98	1.3	1.3	1.1
Cadmium		3.9		.29	.81		2.4	3.8	.75	1 K		.31	.35
Calcium		N/A	1970	188000	1550	3230	8440	1920	2040	1440	668	2490	28100
Chromium		39	20.5	14.2	18	19.5	30.6	21.5	26.8	25.6	21.5	19.5	21.3
Cobalt		470	16.3	4.8	27.7	35.1	99.4	31.7	31	54.7	10.4	17.2	10.8
Copper		310	25.9	10.6 K	63	25.8	299	82.2	92.5	91.7	23.2	26.5	18.2
Iron	H	2300	37300	12300	39100	36700	103000	49100	62500	59500	32500	35600	33000
Lead		400	18.6	7.8	36.2	15.4	133	34.6	47.2	54.5	18.2	21.5	23.6
Magnesium		N/A	1800	16800	1580	2670	1210	858	1820	1530	2330	1870	4680
Manganese	H	180	414	158	230	427	646	392	436	457	165	638	250
Mercury		2.3											
Nickel		160	22.7	8.4	21.5	32.1	39.4	13.1	30.4	27.7	30.7	22.8	17.1
Potassium		N/A	1660 J	1390 J	1780 J	1630 J	1430 J	1420 J	1340 J	1540	2020 J	1490 J	1390 J
Selenium		39											
Sodium		N/A	158 J	246 J	242 J	184 J	404 J	408 J	179 J	204 J	185 J	155 J	174 J
Thallium	H	0.63											
Vanadium		55	28.4	17.4	23.7	25.4	18.4 J	20.7	22.6	23.1	21.5	26.3	30.9
Zinc	H	2300	111	39.3	3120	147	18200	7510	4100	4680	102	437	249

Notes:
COPC column lists chemicals of potential concern based on human health screen (H).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
* Duplicate sample collected
ft bgs = feet below ground surface
Blank cells indicate the sample was below the detection level for that constituent.
B = Chemical not detected substantially above the level found in associated laboratory of field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 4
Summary of Detected Inorganics in Subsurface Soil Samples
Rhinehart Fire Tire Site

STATION	COPCs	RBC	SB-1-15A	SB-1-15B	SB-1-16A	SB-1-16B	SB-1-17A	SB-1-18A	SB-1-18B	SB-1-19A	SB-1-20A	SB-1-21A
Station Location		CONC.		Bench 2						Bench 1		
MW Association												
Depth of Sample (ft bgs)			2 - 4	7 - 10	2 - 4	6 - 8	1.5 - 4	2 - 4	4 - 6	2 - 4	2 - 4	2 - 4
INORGANICS (MG/KG)												
Aluminum	H	7800	13600	10600	12300	10200	12500	12000	14300	8600	10600	13100
Antimony	H	3.1	4.2 K	11.7 K	3.3 K	5.7 K	6.1 K	47.1 K	3.7 K	11.3 K	10.1 K	5 B
Arsenic	H	0.43	19.9	22.1	14.1	13.5	20.5	10.8	12.7	19.6	20.4	15
Barium		550	165	76	109	97.9	106	106	89.7	148	163	125
Beryllium	H	0.015	1.4	.63	1.4	1	1.3	1	1.3	.75	1.1	1.3
Cadmium		3.9	.48 K	3.4	.42 K	1.2 K	1.5 K	.55 K	.26 K	3.1	.45 K	
Calcium		N/A	808	4780	461	884	1260	568	513	1650	3250	784
Chromium		39	20.9	20.7	22.4	18	22.8	18.2	23.4	23.4	24.5	24.9
Cobalt		470	27.1	43.2	23.3	40	30.6	14,8 K	16.7 K	62.5	62.9	25.8
Copper		310	42.7	201	23	104	95.1	32.4	25	248	145	44.3
Iron	H	2300	43000	63600	39800	42800	49000	30600	42000	69800	50600	45600
Lead		400	31.2	78.9	19.1	34.9	37.8	21.6	18	105	84.8 J	33.5 J
Magnesium		N/A	2270	987	2710	1520	1970	1570	1720	1210	1730	1650
Manganese	H	180	593	378	304	351	260	232	185	663	703	376
Mercury		2.3										
Nickel		160	29.8	23.7	28.4	25	28.2	17.5 K	20.3	28.6	32.9	27
Potassium		N/A	1880 J	1700 J	1700 J	1490 J	1930 J	1870 J	1870 J	1220 J	1340	1900
Selenium		39	1.5 L									
Sodium		N/A	154 J	333 J	144 J	218 J	205 J	205 J	154 J	199 J	226	196
Thallium	H	0.63										1.9 L
Vanadium		55	25.3	21.4 K	36.7	21,4 K	27.7	26.6	29.2	18.7 K	22.6	28.7
Zinc	H	2300	1300	9580	690	5270	6030	1720	395	8990	10800	2260

Notes:
COPC column lists chemicals of potential concern based on human health screen (H).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
ft bgs = feet below ground surface
Blank cells indicate the sample was below the detection level for that constituent.
B = Chemical not detected substantially above the level found in associated laboratory of field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 4
Summary of Detected Inorganics in Subsurface-Soil Samples
Rhinehart Tire Fire Site

STATION	COPCs	RBC	SB-1-22A	SB-1-23A	SB-1-23B	SB-1-24A	SB-1-25A	SB-1-26A	SB-1-27A	SB-1-27B	SB-1-28A	SB-1-28A*
Station Location		**CONC.**	**Bench 4**					**Background**	**Bench 3**		**Massey Run**	
MW Association						**MW-2**	**MW-1**	**MW-7**	**MW-3**		**MW-4**	
Depth of Sample (ft bgs)			2 - 4	2 - 4	5 - 7	2 - 3.5	2 - 3.5	2 - 4	2 - 4	4 - 6	2 - 4.5	2 - 4.5
INORGANICS (MG/KG)												
Aluminum	H	7800	16600	15300	15900	16600	13800	12100	14100	12500	18100	18700
Antimony	H	3.1	4 B	5.5 B	3 B	3.5 B	2.4 B	1.7 B	3.1 B	3.1 B	3.2 B	1.9 B
Arsenic	H	0.43	18.8	21.9	11.9	3 K	10.6	6.4	17.6	15.8	14.7	16.2
Barium		550	109	79.5	11.9	132	92.6	35.7	95.6	103	125	109
Beryllium	H	0.015	1.6	1.7	1.4	1.8	.91	.97	1.1	.96	1.3	1.2
Cadmium		3.9										
Calcium		N/A	1740	295	344	357	277	208	753	500	387	399
Chromium		39	26.1	25.2	24.6	28.4	23.1	19.6	22.2	20.4	23.7	23.6
Cobalt		470	25	19.3 K	21.9 K	16.6 K	6.3	3.3 K	11.2 K	10.9 K	23.47	23.8
Copper		310	27.8	23.1	25.6	31.8	16	17 B	20.4	16	22.4	23.9
Iron	H	2300	41200	54800	41100	50200	41000	38300	37600	34400	42200	39600
Lead		400	27.3 J	39.3 J	31.2 J	12.2 J	25.8 J	6.8 J	19.6 J	16 J	25.1 J	26.8 J
Magnesium		N/A	2110	1480	1620	1780	1280	647	2110	1740	2590	2740
Manganese	H	180	524	257	553	235	35.5	19.3	205	268	767	607
Mercury		2.3							.79			
Nickel		160	30	28	26.7	28.7	13.4	12.8 K	22.4	18.5	29.8	29.4
Potassium		N/A	1780	1450	1490	2030	1340	885	1260	1150	1480	1590
Selenium		39										
Sodium		N/A	167	124	133	168	133	105	131	164	126	142
Thallium	H	0.63										
Vanadium		55	29.4	26.6	28.2	26	33.6	24.2	26.5	269	27.8	27.8
Zinc	H	2300	216	89.3	82.5	83.1	50.9	39.1	76	56.7	96.9	102

Notes:
COPC column lists chemicals of potential concern based on human health screen (H).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
ft bgs = feet below ground surface
Blank cells indicate the sample was below the detection level for that constituent.
B = Chemical not detected substantially above the level found in associated laboratory of field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 5
Summary of Detected Pesticides and Semivolatile Organics in Subsurface-Soil Samples
Rhinehart Tire Fire Site

STATION	COPCs	RBC	SB-1-10A	SB-1-10B	SB-1-11A	SB-1-11B	SB-1-12A	SB-1-12B	SB-1-13A	SB-1-13A*	SB-1-13B	SB-1-14A	SB-1-14B
Station Location		**CONC.**		**Bench 3**									
MW Association												**MW-6**	
Depth of Sample (ft bgs)			2 - 4	6 - 8	1.5 - 3.5	4 - 5	2 - 4	5 - 7	2 - 4	2 - 4	5 - 6.5	2 - 4	6 - 8
PESTICIDES (µg/kg)													
4,4'-DDT		1900					5 J						
delta-BHC		100						3.4 J					
Endosulfan I		47000						3 J					
Endosulfan II		47000			5.5 J		9.2 J	17 J	6.6 J				
Endosulfan sulfate		47000			3.8 J			6.8 J					
Heptachlor epoxide		70						5.3 J					
SEMIVOLATILE ORGANICS (µG/KG)													
2-Methylnapthalene		310000					980 J	3500					
Ancenaphthene		470000					410 J	970 J					
Anthracene		2300000						310 J					
Benzo(a)anthracen	H	880			47 J			540 J					
Benzo(a)pyrene		88						260 J					
Benzo(b)flouranthene		880						340 J					
Benzo(g,h,i)perylene		N/A						240 J					
Bis(2-Ethylhexyl)phthalate		46000	2200	240 B	2100	1700	1000 B	1400 B	4500	2400	2200	140 B	3000
Chrysene		88000			68 J		540 J	820 J	99 J	72 J			
Flouranthene		310000			64 J		790 J	1000 J					
Flourene		310000						780 J					
Napthalene		310000					500 J	2400					
Phenanthrene		230000			55 J		1200 J	2500		43 J			
Pyrene		230000			100 J		1100 J	1500 J	84 J				

Notes:
COPC column lists chemicals of potential concern based on human health screen (H).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
* Duplicate sample collected
ft bgs = feet below ground surface
Blank cells indicate the sample was below the detection level for that constituent.
B = Chemical not detected substantially above the level found in associated laboratory of field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 5
Summary of Detected Pesticides and Semivolatile Organics in Subsurface-Soil Samples
Rhinehart Tire Fire Site

STATION	COPSs	RBC Conc.	SB-1-15B	SB-1-15A	SB-1-16B	SB-1-16A	SB-1-17A	SB-1-18B	SB-1-18A	SB-1-19A	SB-1-20A	SB-1-21A
Station Location			Bench 2							Bench 1		
Depth of Sample (ft bgs)			7 - 10	2 - 4	6 - 8	2 - 4	1.5 - 4	4 - 6	2 - 4	2 - 4	2 - 4	2 - 4
PESTICIDES (µg/kg)												
delta-BHC		3.4	5.2 J									
Endrin aldehyde		6.4										6.4
SEMIVOLATILE ORGANICS (µg/kg)												
Benzo(b)fluoranthene		43			43 J							
Bis(2-Ethylhexyl)phthalate		1400	2400	1200 B	2000	1800	1400	5100 B	3400 J	2300 B	3000 B	3500 B
Chrysene		65	72 J		65 J		83 J					
Di-n-butylphthalate		46				46 J						
Fluoranthene		47	47 J									
Napthalene		54	54 J									
Phenanthrene		43	160 J									
Pyrene		47	47 J									

Notes:
COPC column lists chemicals of potential concern based on human health screen (H).
RBC Concentrations are from Risk-Based Concentration Table, October 22, 1997. U.S. EPA Region II, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
ft bgs = feet below ground surface
Blank cells indicate the sample was below the detection level for that constituent.
B = Chemical not detected substantially above the level found in associated laboratory or field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 5
Summary of Detected Pesticides and Semivolatile Organics in Subsurface-Soil Samples
Rhinehart Tire Fire Site

STATION	COPSs	RBC Conc.	SB-1-22A	SB-1-23B	SB-1-23A	SB-1-24A	SB-1-25A	SB-1-26A	SB-1-27B	SB-1-27A	SB-1-28A	SB-1-28A*
Station Location			Bench 4					Background	Bench 3		Massey Run	
MW Association						MW-2	MW-1	MW-7	MW-3		MW-4	
Depth of Sample (ft bgs)			2 - 4	5 - 7	2 - 4	2 - 3.5	2 - 3.5	2 - 4	4 - 6	2 - 4	2 - 4.5	2 - 4.5
SEMIVOLATILE ORGANICS (µg/kg)												
Bis(2-Ethylhexyl)phthalate		46000	5000 B	3500	4300	2200	5600	2700	2200	6000	1400	1700

Notes:
COPC column lists chemicals of potential concern based on human health screen (H).
RBC Concentrations are from Risk-Based Concentration Table, October 22, 1997. U.S. EPA Region II, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
ft bgs = feet below ground surface
Blank cells indicate the sample was below the detection level for that constituent.
B = Chemical not detected substantially above the level found in associated laboratory or field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 6
SUMMARY OF DETECTED CONSTITUENTS IN SURFACE-WATER SAMPLES FROM BACKGROUND LOCATIONS
RHINEHART TIRE FIRE

STATION	SW-1-21	SW-1-22	SW-1-23	SW-1-24	SW-1-24*	SW-1-25	SW-1-26	SW-1-26*	SW-1-27	SW-1-28	Max. Detected Concentration	Mean Concentration
INORGANICS (UG/L)												
Barium	24.3	28	28.8	20.7	26.2	20.4	18.4	19.2	23.9	17.8	28.8	23.6
Calcium	6350	6680	6550	5700	7030	6590	5990	6070	6230	6160	7030	6458
Chromium					6.3						6.3	1.23
Cobalt				3.4							3.4	1.3
Iron	2310	1770	1930	2120	2470	1060	947	968	859	796	2470	1520
Lead							2.2	2			2.2	1.15
Magnesium	4860	5140	4970	4360	5280	2440	2220	2280	2310	2290	5280	3696
Manganese	1340	1950	1910	1230	1520	513	463	476	739	442	1950	1111
Mercury			1.2		1.7				1.1 B		1.7	0.44
Potassium	244	250	288	322	291	441	413	433	426	411	441	352
Selenium	5										5	2.81
Sodium	3820	4050	3860	3480	4220	1080	932	1050	1020	983	4220	2510
Vanadium				4							4	0.94
Zinc	3.7	3.1	3.9		6	5.2	4.4	4	4	2.7	6	4.13
SEMIVOLATILE ORGANICS (UG/L)												
Butylbenzylphthalate					1 J						1 J	NA
Di-n-butylphthalate					2 J	1 J		2 J	1 J	2 J	2 J	NA

Notes:
* Duplicate sample collected.
Blank cells indicate the sample was below the detection level for that constituent.
NA = Not Applicable.
B = Chemical not detected substantially above the level found In associated laboratory or field blank.
J = Estimated value. Measured value Is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 7
SUMMARY OF DETECTED CONSTITUENTS IN SURFACE-WATER SAMPLES FROM RHINEHART'S POND
RHINEHART TIRE FIRE

STATION	COPSs	RBC Conc.	BTAG Value	SW-1-1A	SW-1-1B	SW-1-2A	SW-1-2B	SW-1-3A	SW-1-3B	SW-1-4A	SW-1-4B	SW-1-5A	SW-1-5B	SW-1-6A	SW-1-6B	SW-1-7A	SW-1-7B	SW-1-8A
Depth of Sample (ft bws)				0.5	3	0.5	6	0.5	5	0.5	6	0.5	7	0.5	6	0.5	3	0.5
INORGANICS (UG/L)																		
Barium		260	10,000	27.8	26.2	22.6	22.7	22.9	22.3	21.8	25.8	23.2	25.9	25.4	25.9	25.6	25.4	25.8
Calcium		N/A	N/A	34300	32300	29400	29600	29400	26700	26800	27500	26300	31200	31300	32000	31300	30900	31600
Cobalt		220	35,000						2.1									
Copper		150	6.5	4.7 B	3.4 B	7.9 B	5 B	5.5 B	4.5 B	6.4 B	5.4 B	6	5.8 B	6.5 B	2.6 B	6.1 B	5.9 B	5.1 B
Cyanide	E	73	5.2				9.1			9.7	9.2		55.6	50.5		64	61.6	60.4
Iron		1,100	320	114 B	113 B	83.8 B	106 B	116 B	131 B	85.2 B	216 B	174	134 B	91.5 B	107 B	105 B	118 B	117 B
Magnesium		N/A	N/A	6630	6210	5630	5670	5630	5220	5190	5400	5150	6000	6050	6160	6070	5990	6120
Manganese	H	84	14,500[ab]	89	100	51.4	76.05	91.1	89.09	70.2	76	83	128	86.2	98	84.3	91.7	83.3
Mercury		1.1	.012[ab]				.32 B				.32 B		1 B	.61 B	.4 B		.51 B	
Potassium		N/A	N/A	2050	1900	1620	1660	1630	1650	1560	1590	1520	2060	1850	1860	2080	1840	2120
Sodium		NA	N/A	5160 B	4810 B	4210 B	4240 B	4190 B	4030 B	3990 B	3960 B	3970	4480 B	4600 B	4610 B	4500 B	4460 B	4590 B
Thallium	H	0.29	40							7.4 L								
Vanadium		26	<10,000						2.3			1.2						
Zinc		1,100	30[b]	14.8 B	8.9 B	8.7 B	9 B	9.2	8.8 B	10.5 B	12 B	12.8	12.4 B	10.2 B	9 B	9.9 B	11.9 B	14.5 B
SEMIVOLATILE ORGANICS (UG/L)																		
Di-n-butylphthalate		370	N/A															2J

Notes:
ft bws = feet below water surface
COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
BTAG values are from Region III BTAG Screening Levels, 8/9/95.
*Duplicate sample collected.
Blank cells indicate the sample was below the detection level for that constituent.
a = value dependant on pH.
b = value dependant on hardness.
B = Chemical not detected substantially above the level found in associated laboratory or field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 8
SUMMARY OF DETECTED CONSTITUENTS IN SURFACE WATER SAMPLES FROM STREAMS
RHINEHART TIRE FIRE

STATION	COPCs	RBC Conc.	BTAG Value	SW-1-9	SW-1-11	SW-1-13	SW-1-14	SW-1-14*	SW-1-15	SW-1-16	SW-1-17
STATION LOCATION				Massey Run		Hogue Creek - Background			Hogue Creek		
INORGANICS (UG/L)											
Aluminum		3,700	25[a]	343	146 B						
Barium		260	10,000	90.2	93.8						
Calcium		N/A	N/A	101000	88900	22500	32600	32600	23000	43400	43000
Cobalt		220	35,000		2.2						
Copper	H, E	150	6.5	25	5 B						
Cyanide	E	73	5.2	10.1	10						
Iron	H, E	1,100	320	7250	937	136	145	210	413		
Magnesium		N/A	N/A	21900	12900	4200	4890	4960	4390	4950	4730
Manganese	H	84	14,500[a,b]	752	1320	121	40		62	19	17
Potassium		N/A	N/A	3720	1500	19000	1660	1640	2060	1440	1370
Sodium		N/A	N/A	13400	6010	4690	2980	2910	3380	2620	2560
Thallium	H	0.29	40	6.6 L							
Vanadium	H	26	<10,000	1	1.6					69	
Zinc	H, E	1,100	30[b]	1380	5.3						

Notes:
COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
BTAG values are from Region III BTAG Screening Levels, 8/9/95.
*Duplicate sample collected.
a = value dependant on pH.
b = value dependant on hardness.
Blank cells indicate the sample was below the detection level for that constituent.
B = Chemical not detected substantially above the level found in associated laboratory or field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 9
SUMMARY OF DETECTED INORGANICS IN SEDIMENT SAMPLES FROM RHINEHART'S POND
RHINEHART TIRE FIRE

STATION	COPSs	RBC Conc.	BTAG Value	SD-1-4A	SD-1-5A	SD-1-6A	SD-1-7A	SD-1-8A	SD-1-9A	SD-1-10A	SD-1-11A	SD-1-12A	SD-1-13A	SD-1-14A	SD-1-35	SD-1-36	SD-1-36*	SD-1-37	SD-1-38	SD-1-39	SD-1-40	SD-1-41	SD-1-42
INORGANICS (MG/KG)																							
Aluminum	H	7800	N/A	15700	20400	25200	23500	30400	26700	25100	21400	21200	21100	18400	26400	21200	23400	20300	24100	20200	26600	29400	19700
Antimony	H	3.1	150	1.6 B	3.2 B		2.2 B	2.7 B				2.6	2.3	1.8	1.7	2.4			2.8	2.2	4	1.8	1.9
Arsenic	H, E	0.43	8.2	14	13.9	9.3	13	14.8	13.1	11.2	11.7	11.5	12.1	10.8	19.5	11.8	12.5	15.2	13.6	12.7	16.4	16.2	13.8
Barium		550	N/A	112	139	200	143	180	172	172	154	147	128	121	160	150	150	156	150	140	201	216	137
Beryllium	H	0.15	N/A	1.1	1.2	1.4	1.2	1.6	1.2	1.3	1.4	1.2	1.11	1.1	1.4	1.1	1.2	1.2	1.2	1.1	1.6	1.6	1.2
Cadmium	E	3.9	1.2		.66		.59	.67	.49	.43	.64	.72	.29	.4	.85	.47	.62	.57	.63		.74	2.1	
Calcium		N/A	N/A	3780	5230	1710	1710	10800	5920	2470	2990	10000	5360	2940	2960	11500	12200	27100	7910	1460	4940	1930	1520
Chromium	H	39	<81	28.8	28.1	26.2	28.3	35.3	28.3	27.5	26.8	39.2	26.6	23.5	31.1	25.1	27.6	44.1	29.9	25.1	47.1	33.8	26.8
Cobalt		470	N/A	25.2	29.8	22.2	42.2	37.5	51	36.1	34	38.5	37.6	35.7	42.8	28.3	31.9	32	37.9	22.6	48.7	38.5	33.1
Copper	E	310	34	28.5	35.4	29.5	31.9	34.7	26.8	25.7	24.4	30.7	25.3	28.5	30.3	29.7	31.6	31.7	30.3	30.2	47.1	37.9	36.2
Iron	H	2300	N/A	47400	41500	30000	36800	44000	36000	36300	35000	40600	33300	34900	40400	34700	36600	41500	40400	36800	72500	43800	40700
Lead	E	400	46.7	28.8	36.8	30	33.4	41.2	30	29.3	29.5	37.8	33.3	33	35.3	33.3	35.3	34.5	36	33.4	54	43.6	39.8
Magnesium		N/A	N/A	2050	2640	2190	2680	4380	3260	2850	2860	3620	2860	2180	3250	3290	3720	3530	3630	2110	3960	2850	2230
Manganese	H	180	N/A	762	500	501	497	545	488	624	1200	1470	452	280	790	427	513	1190	876	591	1730	642	327
Mercury	E	2.3	0.15	.22 B		.28 B	.34 B	.3 B	.16 B	.8 B	.28 B									.19 K			
Nickel	E	160	20.9	23.1	28.5	25.3	29.8	33.5	29.1	28.9	28.6	28.4	25.3	27.8	31.2	27.6	27.9	27.7	28.9	24.9	41	34.1	28.9
Potassium		N/A	N/A	1830 J	2550 J	2830 J	2880 J	3960 J	3090 J	2830 J	2380 J	2760 J	2520 J	2330 J	3030 J	2570 J	3140 J	2780 J	3240 J	2530 J	3560 J	3900 J	2600 J
Selenium	E	39	N/A			3.9					2.1 J												
Sodium		N/A	N/A	216 B	294 B	307 B	317 B	405 B	332 B	276 B	251 B	314	264	236	312	324	363	313	304	254	418	359	245
Thallium	H	0.63	N/A																		3.8 K		
Vanadium	H	55	N/A	33.9	36.5	40.8	40	51.9	43	41.6	36.1	50.8	37.2	33.1	45.9	38.1	40.7	59.9	42.3	35.7	52.1	49.7	37.4
Zinc	H, E	2300	150	1470	1800	771	2370	2640	1950	1650	1890	2260 J	1730 J	2310 J	2640 J	1690 J	2250 J	2160 J	2460 J	1320 J	3180 J	2580 J	2330 J

Notes:
COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
BTAG values are from Region III BTAG Screening Levels, 8/9/95.
Duplicate sample collected.
Blank cells indicate the sample was below the detection level for that constituent.
B = Chemical not detected substantially above the level found in associated laboratory or field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 10
SUMMARY OF DETECTED CONSTITUENTS IN SEDIMENT SAMPLES FROM RHINEHART'S POND
RHINEHART TIRE FIRE

STATION	COPCs	RBC	BTAG	SD-1-4A	SD-1-5A	SD-1-6A	SD-1-7A	SD-1-8A	SD-1-9A	SD-1-10A	SD-1-11A	SD-1-12	SD-1-13	SD-1-14	SD-1-35	SD-1-36	SD-1-36*	SD-1-37	SD-1-38	SD-1-39	SD-1-40	SD-1-41	SD-1-42
PESTICIDES (UG/KG)		**Conc.**	**Value**																				
Dieldrin		40	N/A			7.1 J																	
Endosulfan I		47,000	N/A			3.4 J																	
Endrin		2,300	N/A			30 J													11 J	6 J		7.3 J	
Endrin ketone		2,300	N/A			8.9 J													11 J				
SEMIVOLATILE ORGANICS (UG/KG)																							
Benzo(a)anthracene	H, E	880	261										170 J						3900 J				
Benzo(a)pyrene	H	88	430										150 J	56 J									
Benzo(b)fluoranthene		880	3,200										96 J					69 J					
Benzo(g,h,i)perylene			670										130 J										
Benzo(k)fluoranthene		8,800	N/A										100 J										
Chrysene	E	88,000	384					76 J					200 J	59 J				120 J	570 J				61 J
Fluoranthene	E	310,000	600					82 J					450 J					100 J	650 J				82 J
Indeno(1,2,3-cd)pyrene		880	600										110 J										
Phenanthrene	E	230,000	240					70 J					300 J	74 J			85 J	110 J	980 J				
Pyrene	E	230,000	665				76 J	180 J					300 J				83 J	190 J	790 J			490 J	140 J
VOLATILE ORGANICS (UG/KG)																							
2-Butanone		4,700,000	N/A			52	38	76	13 J							49	170		46	53	50	15 J	
Acetone		780,000	N/A	81 B	86 B	190 J	180 J	330 J	110 J	28 B	14 B	82 B	11 B	18 B	22 B	200 J	490 B	130 J	170 J	200 J	250 J	61 B	100 B
Ethylbenzene	E	780,000	10					39										3 J					
Toluene		1.60E+06	N/A					2 J															
xylene (total)		1.60E+07	40					21								2 J		2 J		2 J			

Notes:
COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D. (Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
BTAG values are from Region III BTAG Screening Levels, 8/9/95.
* Duplicate sample collected.
Blank cells indicate the sample was below the detection level for that constituent.
B = Chemical not detected substantially above the level found in associated laboratory of field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 11
SUMMARY OF DETECTED INORGANICS IN SEDIMENT SAMPLES FROM STREAMS
RHINEHART TIRE FIRE

STATION	COPCs	RBC	BTAG	SD-1-19	SD-1-20	SD-1-20*	SD-1-15	SD-1-16	SD-1-17	SD-1-18	SD-1-21	SD-1-22
STATION LOCATION		Conc	Value	Background - Hogue Ck.			Massey Run			Unnamed Tributary	Hogue Creek	
INORGANICS (MG/KG)												
Aluminum	H	7800	N/A	17500	14000	16500	15800	13500	14600	19100	17700	13400
Antimony		3.1	150				1.4	1.9				
Arsenic	H, E	0.43	8.2	16	14.6	17.9	18.3	16.5	8	17.2	17.6	8.3
Barium		550	N/A	208	158	161	103	76.5	120	173	199	163
Beryllium	H	0.15	N/A	1.5	1.4	1.5	1.5	1.4	1.1	1.9	1.6	1.2
Cadmium		3.9	1.2		.5			.48				
Calcium		N/A	N/A	1800	1150	1310	5640	28600	8030	555	1400	1000
Chromium		39	<81	27.9	23.5	28.3	26.9	26.6	19.8	29.8	28.8	20.2
Cobalt		470	N/A	22.3	21.6	20.6	20.1	27.9	14.8	20.4	24.4	17
Copper	E	310	34	18	17.2	17	20.1	35.8	19.3	22.8	17.2	13.1
Iron	H	2300	N/A	42000	43400	45500	52300	62900	29400	55100	48400	27600
Lead		400	46.7	24.5	22.4	19.7	29.6	26.1	18.9	26.1	18.7	17.6
Magnesium		N/A	N/A	2260	2400	2350	3610	4550	2070	2740	2310	1580
Manganese	H	180	N/A	1700	384	385	457	2380	2340	1200	1240	608
Nickel	E	160	20.9	52.4	43	43.8	26.5	34.4	23.7	46.7	46.6	35.7
Potassium		N/A	N/A	2100	1570	2260	1580 J	1470 J	1900 J	2610	2180	1860
Sodium		N/A	N/A				213	195	226			
Vanadium		55	N/A	32.7	29.7	37.7	34.8	26.8	25.3	32.8	36.5	27.1
Zinc	H, E	2300	150	111	90.6	95.5	1420 J	3410 J	147 J	98	124	115

NOTES:

COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
RBC Concentrations are from Risk Based Concentration Table, October 22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D.
(Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
BTAG values are from Region III BTAG Screening Levels, 8/9/95.
*Duplicate sample collected.
Blank cells indicate the sample was below the detection level for that constituents.
B = Chemical not detected substantially above the level found in associated laboratory or field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 12
SUMMARY OF DETECTED CONSTITUENTS IN SEDIMENT SAMPLES FROM STREAMS
RHINEHART TIRE FIRE

STATION	COPCs	RBC Conc.	BTAG Value	SD-1-15	SD-1-16	SD-1-17	SD-1-18	SD-1-19	SD-1-20	SD-1-20	SD-1-21	SD-1-22
STATION LOCATION				Background - Hogue Creek			Massey Run			Unnamed Tributary	Hogue Creek	
PESTICIDES (UG/KG)												
Endrin		2300	N/A	5.6 J								
SEMIVOLATILE ORGANICS (UG/KG)												
Benzo(a)pyrene		88	430									200 J
Phenanthrene		230000	240	370 J								
VOLATILE ORGANICS (UG/KG)												
2-Butanone		4700000	N/A						1 J	1 J		
4-Methyl-2-pentanone		626000	N/A	13 J								
Ethylbenzene		780000	10	3 J								
Trichloroethene		58000	N/A				2 J	2 B				

Notes:

COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
RBC Concentrations are from Risk Based Concentration Table, October22, 1997. U.S. EPA Region III, Roy L. Smith, Ph.D.
(Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
BTAG values are from Region III BTAG Screening Levels, 8/9/95.
*Duplicate sample collected.
Blank cells indicate the sample was below the detection level for that constituents.
B = Chemical not detected substantially above the level found in associated laboratory or field blank.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported.
L = Biased low. Actual value may be higher than reported.

Table 13
Summary of Detected Constituents in Groundwater
Rhinehart Tire Fire Site

STATION	COPCs	RBC	MW-1D		MW-1S		MW-2D		
Sampling Round		Conc.	1st	2nd	1st	2nd	1st	2nd	2nd Dup
INORGANICS (µg/L)									
Aluminum (Total)		3700	196 B		2790 J	7340 C	389	588	
Antimony (Total)		1.5							
Arsenic (Total)	H	0.05	9.5		2.3		6.5		
Arsenic (Dissolved)		0.05	8.3		2.2		6.4		
Barium (Total)	H	260	245	202 C	403	469 C	306	291	285
Barium (Dissolved)		260	238	200 C	378	392	299	297 E	296 E
Calcium (Total)		N/A	26400	25800 C	28000	2400 C	10900	1900	1200
Calcium (Dissolved)		N/A	25500	25000 C	26200	40400 CC	10800	12000 E	12300 E
Chloride (Total)		N/A	5.58		17.8		5.11		
Chromium (Total)**		18			6.8	26 C			
Cobalt (Total)		220							
Cobalt (Dissolved)		220							
Copper (Total)		13000							
Copper (Dissolved)		13000			5 B				
Cyanide (Total)		73	2 B				1.5 B		
Fluoride (Total)		220	.196		.287		.163		
Hardness		N/A	125	92	137	184	62.7	36	52
Iron (Total)	H	1100	1520	1330 C	4310 L	19800 C	4150	6560	3980
Iron (Dissolved)		1100	1040	1190 C	344 L	402 C	1820	2780	2860
Lead (Total)**		15	.6 B		.9	7 C	3.7 B	4	
Magnesium (Total)		N/A	14900	15000 C	17200	14000 C	8520	9480	9650
Magnesium (Dissolved)		N/A	14700	14500 C	16800	18800 CC	8500	9370	9640
Manganese (Total)	H	84	227	255 C	1540	1500 C	971	1080	1090
Manganese (Dissolved)		84	233	256 EC	1600	1880 CC	951	1060	1110 E
Mercury (Total)		1.1							
Mercury (Dissolved)		1.1	.1 J						
Nickel (Total)		73							
Nickel (Dissolved)		73							
Nitrate (Total)		5800			.673	.5			
Potassium (Total)		N/A	930 L		3420	2820 C	956 L		
Potassium (Dissolved)		N/A	844 L		1970	2030 C	960 L		
Sodium (Total)		N/A	13000	12800 C	12500	9290 C	10200	10000	10100
Sodium (Dissolved)		N/A	13100	12700 C	11600	9810 EC	10100	9980	10500 E
Sulfate		N/A	5.34	5.7	8.46	79.5	6.19	15.6	14
TSS		N/A	8	4 J	44	354 J	13	49	7
Vanadium (Total)**		26			3.8				
Zinc (Total)		1100	4 B		18.1 B	44 C	5.7 B		
Zinc (Dissolved)		1100	11.4 B		10.1 B		10.3 B		
VOLATILE ORGANICS (µg/L)									
1,2,4-Trimethylbenzene		1.2				.1 J			
Benzene		0.36			.2 J				
Carbon disulfide		100							
Toluene		75		.1 J	1	.2 J			.1 J
Total Xylenes		1200			.8 J				

Notes:

COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
RBC Concentrations are from Risk-Based Concentration Table, October 22, 1997. U.S. EPA Region II, Roy L. Smith, Ph.D.
(Cancer benchmarks value = 1E-06, adjustable HQ = 0.1)
* Duplicate sample collected.
** No inorganic constituents were detected in the dissolved samples.
Blank cells indicate the sample was below the detection level for that constituent.
Lead action level of 15 µg/l for tap water used for the lead RBC.
NC = Sample not collected during sampling round. E = Dissolved metals value exceeds total metals value.
B = Chemical not detected substantially above the level found in associated laboratory or field blank.
C = Biased low. Samples arrived at laboratory required additional preservative to lower ph below 2 or raise pH above 12.
J = Estimated value. Measured value is less than quantitative detection limit.
K = Biased high. Actual value may be lower than reported. L = Biased low. Actual value may be higher than reported.

Table 13
Summary of Detected Constituents in Groundwater
Rhinehart Tire Fire Site

STATION	COPCs	RBC	MW-2S		MW-3D		MW-3S		MW-4D	
Sampling Round		Conc.	1st	2nd	1st	2nd	1st	2nd	1st	2nd
INORGANICS (µg/L)										
Aluminum (Total)		3700	2070	1010	124 B		4490 J	916	12500 J	3600
Antimony (Total)		1.5								
Arsenic (Total)	H	0.05	4.8		13.4	11	11.5		10.1	
Arsenic (Dissolved)		0.05	4.9		12.5	10	4.3		2.1	
Barium (Total)	H	260	232	211	241	201	249	180	562	377
Barium (Dissolved)		260	217	205	243	202 E	206	178 C	274	268
Calcium (Total)		N/A	6610	6620	12700	12700	13900	13600	35700	35900
Calcium (Dissolved)		N/A	6500	6560	12700	13200 E	13300	13800 EC	33300	34900
Chloride (Total)		N/A	2.63		2.48		2.15		4.94	
Chromium (Total)**		18					9.6		22.7	18
Cobalt (Total)		220							8.8	
Cobalt (Dissolved)		220								
Copper (Total)		13000	1.9 B		1.2 B		8.1 B		27	
Copper (Dissolved)		13000	1.1 B		1.2 B		2.2 B		1.4 B	
Cyanide (Total)		73			4 B					
Fluoride (Total)		220	.129		.203		.231		.149	
Hardness		N/A	55.9	52	75.9	56	80.6	60	167	124
Iron (Total)	H	1100	7580	6720	1150 L	4290	8200 L	3080	23200 L	10700
Iron (Dissolved)		1100	2930	3270	944 L	1090	196 B	532 C	464 L	542
Lead (Total)**		15	2 B				8.1	3	16.3	9
Magnesium (Total)		N/A	9690	10400	11800	11800	11900	11100	19200	18000
Magnesium (Dissolved)		N/A	9290	10400	11600	12000 E	10700	11000 C	15900	16100
Manganese (Total)	H	84	1350	1530	1750	1800	2030	1860	573	419
Manganese (Dissolved)		84	1290	1540 E	1750	1880 E	1730	1870 EC	283	290
Mercury (Total)		1.1							.13 K	
Mercury (Dissolved)		1.1								
Nickel (Total)		73							17.2	
Nickel (Dissolved)		73								
Nitrate (Total)		5800								
Potassium (Total)		N/A	1830		570		1760		3300	
Potassium (Dissolved)		N/A	1100		544		454		480	
Sodium (Total)		N/A	5830	5210	9330	8820	10000	217000	20300	19700
Sodium (Dissolved)		N/A	5860	5150	9350	9370 C	9670	9780 C	20000	18300
Sulfate		N/A	3.16	13.4	13.6	22.1	4.73	11.1	8.96	32.5
TSS		N/A	84	48		4 J	93	52 J	262	64 J
Vanadium (Total)**		26	2.1				7		16.9	
Zinc (Total)		1100	9.5B		7.9 B		23 B		56.7	
Zinc (Dissolved)		1100	18.5 B		11.6 B		26.7 B		8.5 B	
VOLATILE ORGANICS (µg/L)										
1,2,4-Trimethylbenzene		1.2								
Benzene		0.36								
Carbon disulfide		100	.4 J						.3 J	.2 J
Toluene		75	.3 J	.1 J	.2 J	.1 J		.2 J		
Total Xylenes		1200								

Notes:

COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
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Table 13
Summary of Detected Constituents in Groundwater
Rhinehart Tire Fire Site

STATION	COPCs	RBC	MW-4S		MW-5D		MW-5S		MW-6D		
Sampling Round		Conc.	1st	2nd	1st	2nd	1st	2nd	1st	1st Dup	2nd
INORGANICS (µg/L)											
Aluminum (Total)		3700	16500 J	6430		293	2550 J	219	125 B		
Antimony (Total)		1.5	15								
Arsenic (Total)		0.05	6.3				17.2		2.6 B		
Arsenic (Dissolved)	H	0.05	1.2		8.8		3.1		2.4 B	NC	
Barium (Total)		260	644	315		502	63.8		231		224
Barium (Dissolved)	H	260	295	220	373	568 C	42.8		232	NC	207
Calcium (Total)		N/A	33100	31100		55000	17400	22000	8750		9250
Calcium (Dissolved)		N/A	31100	28700	37700	35300	16600	21200	8580	NC	9710 E
Chloride (Total)		N/A	8.92				12.3		2.31	2.28	
Chromium (Total)**		18	21.7				24.8				
Cobalt (Total)		220	12.1				61.3	75			
Cobalt (Dissolved)		220					49.3	51		NC	
Copper (Total)		13000	65.2		2 B		7.4 B				
Copper (Dissolved)		13000	1.7 B				1.6 B		2.5 B	NC	
Cyanide (Total)		73	2 B				3 B		2 B		
Fluoride (Total)		220	.255						.196	.202	
Hardness		N/A	165	116		152	96.8	152	66		64
Iron (Total)		1100	27200 L	16200	327 L	879	33500 L	21500	986		899
Iron (Dissolved)	H	1100	61.6 L	127	28.3 B	644	11500 L	14200	768 L	NC	864
Lead (Total)**		15	32.8	11	.5		1		5 B		3
Magnesium (Total)		N/A	19700	19300	9640	13100	14500	16100	10900		11200
Magnesium (Dissolved)		N/A	16000	15500	9360	14900 C	13500	16000	10700	NC	11500 E
Manganese (Total)		84	2040	1620	178	289	3750	3760	1780		1980
Manganese (Dissolved)	H	84	940	1290	159	460 C	3040	3500	1750	NC	2040 E
Mercury (Total)		1.1									
Mercury (Dissolved)		1.1	.56							NC	
Nickel (Total)		73					37.4				
Nickel (Dissolved)		73	16.5				15.8			NC	
Nitrate (Total)		5800									
Potassium (Total)		N/A	4490		1150		2390	2340	865		
Potassium (Dissolved)		N/A	856	2320	687		1640	2250	960 L	NC	
Sodium (Total)		N/A	16600	16500	14800	17500	13700	14100	7900		7780
Sodium (Dissolved)		N/A	15500	15400	14300	17300	13200	13600	7690	NC	7640
Sulfate		N/A	11.2	82.9		6.8	59	67.1	12.7	12.6	23.1
TSS		N/A	710	210 J		39	37	32			
Vanadium (Total)**		26	26.1				3.9				
Zinc (Total)		1100	64.2	28	7.4 B		119	54	3.5 B		
Zinc (Dissolved)		1100	14.4 B		17.6 B		53.5	43	12 B	NC	
VOLATILE ORGANICS (µg/L)											
1,2,4-Trimethylbenzene		1.2									
Benzene		0.36									
Carbon disulfide		100							.4 J		
Toluene		75			.5 J	.2 J	.2 J	.3 J			
Total Xylenes		1200									

Notes:

COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
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(Cancer benchmarks value = 1E-06, adjustable HQ = 0.1)
* Duplicate sample collected.
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Table 13
Summary of Detected Constituents in Groundwater
Rhinehart Tire Fire Site

STATION	**COPCs**	**RBC**	**MW-6S**			**MW-7D**		**MW-7S**	
Sampling Round		**Cons.**	**1st**	**1st Dup**	**2nd**	**1st**	**2nd**	**1st**	**2nd**
INORGANICS (µg/L)									
Aluminum (Total)		3700	3820	4370	1600	365 J		3550 J	3950
Antimony (Total)	H	15							
Arsenic (Total)		0.05	4.7	5.2		23.7	21	4.7	
Arsenic (Dissolved)	H	0.05	3.6 B	3.1 B		23.4	21	2.7	
Barium (Total)		260	102	111		422	420	223	176
Barium (Dissolved)		260	75.5	81.2		427	409	192	166
Calcium (Total)		N/A	9230	9590	7500	16000	16700	12000	13100
Calcium (Dissolved)		N/A	8780	9170	7090	16200	16000	16000	21000 C
Chloride (Total)		N/A	2.31	2.06		7.82		3.78	
Chromium (Total) **		18	7.6	8.6				15.7	48
Cobalt (Total)		220	7.4	9.6				5.5	
Cobalt (Dissolved)		220							
Copper (Total)		13000	6.9 B	8.7		1.9 B		7.9 B	
Copper (Dissolved)		13000				1.9 B		1.2 B	
Cyanide (Total)		73	4 B						
Fluoride (Total)		220	.142	.139		0.14		0.157	
Hardness		N/A	99.6	88	52	101	60	112	96
Iron (Total)	H	1100	7330	1300	6100	3740 L	4800	9910 L	10700
Iron (Dissolved)		1100	2000	1770	1870	3900 L	4540	657	520
Lead (Total) **		15	2.6 B	3.7 B	3			3	
Magnesium (Total)		N/A	14700	15400	12800	15300	17000	17700	18400
Magnesium (Dissolved)		N/A	13900	14400	12000	15200	16400	16700	18700 E
Manganese (Total)	H	84	2130	2220	1850	2230	2550	1570	1460
Manganese (Dissolved)		84	2080	2130	1750	2230	2450	1070	1380
Mercury (Total)		1.1							
Mercury (Dissolved)		1.1					0.2		
Nickel (Total)		73		10.7					56
Nickel (Dissolved)		73							
Nitrate (Total)		5800							
Potassium (Total)		N/A	2220	1270		691		4340	2220
Potassium (Dissolved)		N/A	1110 L	1210 L		549		4560	
Sodium (Total)		N/A	5820	6000	5130	14000	13800	9860	7410
Sodium (Dissolved)		N/A	5670	5960	4820	13900	13000	10600	7760 E
Sulfate		N/A	41.4	39.7	45.2	13.4	25.1	2.23	31.9
TSS		N/A	96	1040	76 J	10	8 J	495	178 J
Vanadium (Total)		26	5	6				3.8	
Zinc (Total)		1100	33.1 K	46.3		15.5 B		27.5 B	
Zinc (Dissolved)		1100	13.4 B	13.4 B		68.5		8.5 B	
VOLATILE ORGANICS (µg/L)									
1,2,4-Trimethylbenzene		1.2							
Benzene		0.36							
Carbon disulfide		100	.3 J						
Toluene		75							
Total Xylenes		1200					0.2 J		

Notes:
COPC column lists chemicals of potential concern based on human health screen (H) or ecological screen (E).
RBC Concentrations are from Risk-Based Concentration Table, October 22, 1997. U.S. EPA Region II, Roy L. Smith, Ph. D.
(Cancer benchmark value = 1E-06, adjusted HQ = 0.1)
* Duplicate sample collected.
** No inorganic constituents were detected in the dissolved samples.
Blank cells indicate the sample was below the detection level for that constituent.
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K = Biased high. Actual value may be lower than reported. L = Biased low. Actual value may be higher than reported.

RHINEHART TIRE FIRE SITE - POND AREA
COST ESTIMATE FOR SEDIMENT REMEDIAL ALTERNATIVE RHP S-4
DREDGING OF CONTAMINATED SEDIMENTS, TRANSPORTATION, AND
OFF SITE DISPOSAL
Table 16

Date 02-Aug-00

ITEM DESCRIPTION	UNITS	QUANTITY	UNIT COST (S) LOW	UNIT COST (S) HIGH	TOTAL COST (S) LOW	TOTAL COST (S) HIGH
1.0 MOBILIZATION/DEMOBILIZATION	LS	1	20000	25000	20,000	25,000
2.0 LEGAL	LS	1	7,500	10,000	7,500	10,000
3.0 SITE SECURITY						
3.1 Temporary Security Fence	LF	1,100	10	15	11,000	16,500
4.0 SITE PREPARATION						
4.1 Dewater Pond, 50,000 gallons +/-	LS	1	10,000	15,000	10,000	15,000
4.2 Diversion System for Stormwater	LS	1	20,000	35,000	20,000	35,000
4.3 Water Pumping/Treatment/Discharge	GAL	150,000	0.05	0.10	7,500	15,000
4.4 Construct Sediment Dewatering Pad	LS	1	15.000	20,000	15,000	20,000
5.0 SEDIMENT DREDGING/DEWATERING						
5.1 Dredging	CY	1,000	20	25	20,000	25,000
5.2 Drying/Dewatering on Concrete Pad	CY	1,000	10	15	10,000	15,000
5.3 Bulking and Loading	CY	1,000	4	8	4,000	8,000
6.0 REMOVAL AT MASSEY'S RUN						
6.1 Cleaning and E&S Controls (check dams)	LS	1	1,500	2,000	1,500	2,000
6.2 Temporary Pump-Around	LS	1	1,000	1,500	1,000	1,500
6.3 Excavate and Load Sediments	CY	15	15	20	225	300
6.4 On-site Haul to Staging Area	LS	1	100	150	100	150
7.0 TRANSPORTATION AND DISPOSAL						
7.1 Transportation	TONS	1,200	30	40	36,000	48,000
7.2 Disposal at Solid Waste Landfill	TONS	1,200	80	100	96,000	120,000
8.0 RESTORATION						
8.1 6 in. Wetlands soil mix	CY	2622	20	25	52,433	65,542
8.2 12 in. Sand support layer	CY	5243	8	12	41,947	62,920
8.3 Planting - Submerged and Bordering	acre	1 8	10,000	12,000	18,000	21,600
8.4 Sediment/Storm Water Controls	LS	1	10,000	15,000	10,000	15,000
8.5 Seeding/Mulching, surrounding area	acre	1	3000	4000	3,000	4,000
9.0 SITE MANAGEMENT	months	2	12,500	15,000	25,000	30,000
Subtotal - Direct Construction Total (DCT)					$ 410,250	$ 555,512
Contractor's Indirect Cost (10% of DCT)					$ 41,021	$ 55,551
Design, EPA Delrverables and Resident Engineering					$ 75,000	$ 100,000
Subtotal - Total Capital Cost (TCC)					$ 526,226	$ 711,063
Contingency (25% of TCC)					$ 131,556	$ 177,766
TOTAL CAPITAL COST					$ 657,782	$ 888,829
PRESENT WORTH O&M COST					$ -	$ -
TOTAL PRESENT WORTH PROJECT COST					$ 657,782	$ 888,829

RHINEHART TIRE FIRE SITE
COST ESTIMATE FOR DECOMMISSIONING OF SITE
REMEDIAL FACILITIES
Table 17

Date 25-Jul-2000

ITEM DESCRIPTION	UNITS	QUANTITY	UNIT COST ($) LOW	UNIT COST ($) HIGH	TOTAL COST ($) LOW	TOTAL COST ($) HIGH
1.0 MOBILIZATION/DEMOBILIZATION (add' l to S-4)	LS	1	3,000	5,000	3,000	5,000
2.0 SITE PREPARATION						
2.1 Install Erosion & Sedimentation Controls	LS	1	2,500	5,000	2,500	5,000
2.2 Clearing by Dam Area	arce	0.5	2,000	2,500	1,000	1,250
2.3 Prepare Haul Roads and Establish Support Zone	LS	1	7,000	8,000	7,000	8,000
3.0 **DEMOLITION**						
3.1 Remove Shotcrete Walls (Excavator & Shear)	LS	1	80,000	95,000	80,000	95,000
3.2 Remove USTs and Oil/Water Separator	LS	1	8,000	10,000	8,000	10,000
3.3 Remove/Wash Wastewater Treatment Equipment	LS	1	5,000	8,000	6,000	8,000
3.4 Remove WWTP Concrete Slab	SF	1000	1.50	2.50	1,500	2,500
3.5 Remove Toe Drains/Underground Piping	LF	1500	10	12	15,000	18,000
3.6 Abandon Manholes and Catch Basins	EACH	7	1,000	1,500	7,000	10,500
3.7 Segregation and Loading (all materials)	LS	1	20,000	30,000	20,000	30,000
3.8 Fence Removal	FOOT	750	10	12	7,500	9,000
4.0 **OFF-SITE RECYCLING**						
4.1 Concrete Recycler (Shortcrete Walls, WWTP, Dam)	LOAD	55	25	30	1,375	1,650
- 1200 tons in 22 ton loads, approx. 55 loads						
4.2 Hauling to Concrete Recycler (90 mile haul)	LOAD	55	200	225	11,000	12,375
4.3 Metal Recycling (Haul cost per 30 cy load)	EACH	12	200	250	2,400	3,000
4.4 T&D of misc. Materials at Subtitle D Landfill	LOAD	8	300	400	2,400	3,200
4.5 T&D of Sludge from O/W Separator and WWTP	Drums	15	600	1,000	9,000	15,000
4.6 T&D of Filter Media	Tons	20	180	225	3,600	4,500
4.7 T&D of Decontamination Water	LOAD	2	1,000	1,200	2,000	2,400
4.8 Waste Characterization Testing (TCLP)	EACH	20	550	600	11,000	12,000
5.0 **DAM REMOVAL AND SITE WORK**						
5.1 Construct Water Division	EACH	1	10000	15000	10,000	15,000
5.2 Excavate and Remove Dam	CY	15500	2.00	3.00	31,000	46,500
5.3 Remove Concrete Structures at Dam	LS	1	10,000	15,000	10,000	15,000
5.4 Haul Material to Benches & Slopes	CY	15500	2.50	3.00	38,750	46,500
5.5 Backfill Material	CY	12500	8	18	100,000	225,000
5.6 Place and Compact Backfill	CY	28000	2.00	2.50	56,000	70,000
5.7 Restore Channel in Former Dam Area	LS	1	20000	25000	20,000	25,000
6.0 **MONITORING WELL ABANDONMENT**						
6.1 Driller Mob/Demob	LS	1	2000	2500	2,000	2,500
6.2 Abandon Shallow Monitoring Well	EACH	8	1500	2000	12,000	16,000
6.3 Abandon Deep Monitoring Well	EACH	8	3000	4000	24,000	32,000
7.0 **FINAL RESTORATION**						
7.1 Imported Topsoil	CY	2500	18	25	45,000	62,500
7.2 Spread Topsoil	CY	2500	2.00	3.00	5,000	7,500
7.3 Seed, Fertilizer, Mulch	ACRE	9	3000	4,000	27,000	36,000
7.4 Additional Drainage Improvements	LS	1	5,000	10,000	5,000	10,000
8.0 **SITE MANAGEMENT (addition to Alt S-4)**	months	3	5,000	10,000	15,000	30,000

	LOW	HIGH
Subtotal - Direct Construction Total (DCT)	$ 601,025	$ 895,875
Contractor's Indirect Costs (10% of DCT)	$ 60,103	$ 89,588
Design, EPA Deliverables and Resident Engineering (in additional to S-4 Alt.)	$ 50,000	$ 60,000
Subtotal - Total Capital Cost (TCC)	$ 711,128	$ 1,045,463
Contingency (25% of TCC)	$ 177,782	$ 261,366
TOTAL CAPITAL COST	$ 888,909	$ 1,306,828
PRESENT WORTH O&M COST (from below)	$ -	$ -
TOTAL PRESENT WORTH PROJECT COS	$ 888,909	$ 1,306,828

Notes:
1. The cost estimates for these actions assume that the work will be performed at the same time and by the same contractor, as the sediment remedial action.
2. Costs presented in times 3.7 and 4.1 - 4.4 assume separation of concrete and metal is feasible during shotcrete removal.
3. Range of the earthfill unit costs in item 5.5 reflects use of on-site versus off-site borrow material.
4. Quantities above are estimates and are based upon Plans and As-Builts provided by U.S. EPA Region III.
5. Costs shown above are additive to Sediment Alternative S-3 or S-4 costs, assuming the work is performed concurrently with the sediment remedial activities. if the decommissioning activities are combined with sediment Alternative S-1 or S-2, costs associated with mob/demob (Item 1.0), site management (Item 8.0), and design, deliverables, and resident engineering will likely increase.
6. Refer to the General Cost Assumptions included in this Appendix.

Rhinehart Tire Fire Operable Unit 3 Superfund Site
Winchester, Virginia

Responsiveness Summary
September 2000

This Responsiveness Summary documents the Stakeholder Issues - the concerns and comments of the community and the local municipality - expressed during the public comment period and EPA's response to those issues. The summary also provides a discussion of technical and legal issues which were raised during the public comment period. The information is organized as follows:

- Overview
- Background on Community Involvement
- Summary of Public Meeting and EPA Responses
- Summary of Comments Submitted by Citizens During the Comment Period and EPA Responses
- Summary of Comments Submitted by the Local Municipality and EPA Responses

I. Overview

The public comment period for Operable Unit 3 of the Rhinehart Tire Fire Superfund Site (Site) began on August 25, 2000 and closed on September 24, 2000. No request was made to extend this 30-day public comment period. To facilitate commenting, EPA held a public meeting on September 12, 2000 in the Round Hill Community Fire Company Building on Round Hill Road, Winchester, Virginia.

At the meeting, EPA discussed the findings of the Remedial Investigation (RI), including the Risk Assessment, the Feasibility Study (FS), and Technical Memorandum Numbers 1 and 2 which were prepared for OU3 of the Site. EPA also presented the Proposed Plan for eliminating and/or mitigating the public health and environmental threats posed by the contamination detected in environmental media associated with this portion of the Site. EPA explained that the preferred remedy includes the following: treating all of the water in Rhinehart's Pond, removing all of the sediment in Rhinehart's Pond, removing the sediment in the first 150 feet of Massey Run, and disposing of all of the sediment in a Subtitle D Landfill. In addition, EPA proposed to decommission the existing facilities. This includes: removing the shotcrete, abandoning the storm water collection system, abandoning the monitoring wells, removing the fencing, removing the oil/water separator, removing the water treatment plant, and removing the dam at Rhinehart's Pond.

The September 12, 2000 public meeting also provided the opportunity for the public to ask questions and express opinions and concerns.

II. Background on Community Involvement

The Site was the location of a fire which engulfed approximately five to seven million tires and could be seen as far as twenty miles away. The fire was put out in several days but smoldered for six months. Media coverage of the fire was extensive. EPA's involvement started with the activation of the Emergency Response Team to help put out the fire and to try and contain as much of the waste product generated from the fire as possible. For the Operable Unit 1 (OU 1) Proposed Plan in 1988, EPA held a public meeting during a 30-day comment period. For the OU 2 Proposed Plan in 1992, EPA offered to hold a public meeting during the 30-day comment period but none was requested.

An Information Repository has been established for the Site at the Handley Library. EPA also established a repository for just the OU 3 Administrative Record at the Old Town Branch of the Handley Library because construction at the main library reduced the hours available to the public to review the documents. Notices for the 30-day public comment period and the September 12, 2000 meeting were placed in the two local newspapers, the Winchester Star and the Northern Virginia Daily, on August 25, 2000.

III. Summary of Public Meeting and EPA Responses

Questions and comments presented at the September 12, 2000 public meeting are summarized in this section and are grouped according to subject. The EPA response follows each of the questions presented. The comments made at the meeting are included after the questions but without any EPA response.

A. Questions

1. How much sediment is EPA proposing to remove?

<u>EPA Response</u>: Approximately 15 cubic yards are proposed to be removed from the first 150 feet of Massey Run and approximately 1,000 cubic yards are proposed to be removed from Rhinehart's Pond.

2. Where will the sediment be disposed of?

<u>EPA Response</u>: In May 2000, the sediment was tested to determine if it would be classified as a

hazardous waste. The results of the test, the Toxicity Contaminant Leaching Procedure or TCLP, show that the sediment is classified as non-hazardous. As such, the sediment can be disposed of in a permitted Subtitle D landfill. The exact landfill, however, will not be determined until the construction contractor selected to perform this work proposes a landfill and the landfill is accepted by EPA and VDEQ.

3. Has any material been previously taken off-site for disposal?

EPA Response: Yes. As part of OU 2, EPA performed work on Dutchman's Pond, which work consisted of removing the sediment at the bottom of the pond, the liner, and the underlying contaminated soil and disposing of all of this material in an off-Site landfill. Although some of the ash from the fire was moved around the Site, none of this material was removed from the Site. Under the Virginia Solid Waste Program, tires which were not burned in the fire and additional tires brought onto the Site after the fire are presently being dug up, shredded, and hauled off-Site for disposal. Similarly, large tanks and vehicles have recently been removed from the Site under Virginia's Solid Waste Program.

4. Who owns the 188 acre farm now? Why isn't Mrs. Rhinehart (since her husband is now deceased) considered a Potentially Responsible Party (PRO) or a lien placed against the property?

EPA Response: EPA responded to this question at the public meeting. The property is presently under the control of a Receiver appointed by the court. We have been informed by the Receiver that he does not envision selling this property, Therefore, as far as we now know, Mrs. Rhinehart will maintain ownership of the property, both the side of the hill where her home is and the opposite side of the hill where the Site is located. As a matter of EPA's enforcement discretion, the Rhineharts have not been notified as PRPs at this Site. Since the fire at the Site was started by an arsonist, Mrs. Rhinehart might have a defense to liability.

5. Why not leave the shotcrete in place?

EPA Response: This is similar to a comment made by Frederick County officials. EPA included removal of the shotcrete as part of the Proposed Plan because it is starting to deteriorate. In response to these comments, the final remedy selected by EPA modifies the Preferred Alternative to provide for an evaluation to be made during design to determine whether it is feasible to leave the shotcrete in place, cover it with clean fill, and vegetate this area.

6. Why remove the sediment from Rhinehart's Pond and Massey Run if it hasn't contaminated the ground water?

EPA Response: As indicated in the Decision Summary portion of this ROD, the ground water at the Site is statistically comparable to the background ground water. The sediment, though, poses other risks. As determined through bioassays, the sediment poses a risk to the environment through direct contact by ecological receptors due to the level of zinc. A threshold criterion used by EPA to select a remedy at Superfund sites is whether the remedy is protective of human health <u>and</u> the environment. The sediment poses an unacceptable risk to ecological receptors. That is why the selected remedy includes removal of the sediment from Rhinehart's Pond and the first 150 feet of Massey Run.

7. Why not leave the monitoring wells in place and monitor the ground water for some additional time, perhaps 20 years?

<u>EPA Response</u>: EPA has monitored the ground water at various points on the Site for over 15 years (the Environmental Response Team (ERT) Ground Water Study was completed in 1984). There does not appear to be a release to ground water, so further monitoring is not necessary. Further, as discussed during the public meeting, leaving the monitoring wells in place invites vandalism and could create a pathway for future contamination of the aquifer.

8. How are monitoring wells abandoned?

<u>EPA Response</u>: There are actually several slightly different methods used to abandon wells, including:

1. Grouting the entire well via tremie pipe and cut off surface casing.

2. Pull the casing, grout the hole, and pull the surface casing.

3. Pour sand into the open or screened interval, grout above the sand layer, and remove the surface casing.

EPA will determine during the design process which method to use.

Comments

1. Speaking on behalf of Mrs. Rhinehart, who did not attend, a gentleman said that she would rather EPA do as little work at the Site as possible in regards to removing the existing facilities. She does not care whether the dam, shotcrete, monitoring wells, or fencing are left at the Site. She would prefer that EPA not take out any of the facilities that do not need to be removed. He also expressed her desire that EPA complete whatever work is necessary in as short a time as possible.

<u>EPA Response</u>: EPA intends to complete the necessary work in as short a time as is feasible.

IV. Summary of Comments Submitted by Citizens During the Comment Period and EPA Responses

A petition signed by 115 local residents was submitted to EPA to express their support for a complete cleanup of the Site as proposed by EPA at the 9/12/00 public meeting. The petitioners requested that the cleanup be in a timely manner and finished as soon as possible with no interference from the State or County.

EPA Response: See response to above comment.

IV. Summary of Comments Submitted by the Local Municipality and EPA Responses

Questions

1. How was the zinc cleanup level for sediment determined, considering zinc is a naturally occurring element in the local shale and sandstone deposits? Were assays performed on samples from the local shale formations? The EPA Region III Risk Based Concentration (RBC) for zinc in residential areas is 25,000 mg/kg. Comparing this number to the cleanup level indicates that is not a problem to human health and safety. Furthermore, we do not believe it to be a threat to the local environmental flora and fauna considering the constant exposure to natural sediment runoff.

EPA Response: The zinc cleanup level for sediment is based on bioassays performed by the EPA Environmental Response Team (ERT). The cleanup level of 1,600 mg/kg is the lowest observed adverse effects level. Assays were not performed on sediment samples from local shale formations. However, the following are the results for zinc in sediment utilized in this environmental risk assessment: 340 mg/kg at the upstream location in Rhinehart's Pond; 2400 mg/kg at the downstream location in Rhinehart's Pond; 4,000 mg/kg at the beginning of Massey Run; 1,600 mg/kg further downstream in Massey Run; 980 mg/kg after Massey Run joins the unnamed creek and before it joins with Hogue Creek; and 47 mg/kg in the background pond. These data indicate that the level in the background pond is much lower than the cleanup level determined by ERT. Also, these data show a declining level of zinc in the stream sediment the further away from the Site the samples are taken. Thus, the cleanup level for zinc in sediment is much greater than the background levels in the area of the Site.

The decision to remove the sediment from Rhinehart's Pond and the first 150 feet of Massey Run is based on a potential threat to ecological receptors, not human health. Therefore, comparing the cleanup level to the RBC value for human health is inconsistent with EPA's purpose. (It should be noted that the Biological Technical Assistance Group (BTAG) has prepared screening values for ecological receptors which are analogous to the values. The BTAG value for zinc in sediment is 150 mg/kg.)

2. Please explain why EPA is proceeding with a costly decommissioning of the Site when

for several the existing treatment plant was totally inoperable and the effluent from the pond was allowed to flow unimpeded into Massey Run. We are estimating that the treatment plant existed in a state of disrepair from approximately 1994 to the date when the new maintenance contractor assumed control.

EPA Response: There were brief periods when water from the pond went over the spillway because the treatment plant was inoperable. This was primarily caused by funding difficulties and then a delay in the procurement of a contractor, due to a bid protest.

EPA will dismantle the treatment plant and the other facilities and removing them from the Site because they will not be needed to convey or treat contamination at the Site once the sediment is removed from the pond. The oil/water separator, storm water system, toe drains, dam, and treatment plant together form the system EPA has used at the Site to collect, temporarily store, and treat the contaminated water at the Site. After the sediment is removed from the pond, the system will not be necessary. EPA will then dismantle and remove the facilities, with the possible exceptions being the shotcrete and the dam, as indicated below.

3. Removal of the shotcrete is not a sound engineering approach to addressing the deterioration of the shotcrete. Secondly, it seems ridiculous to remove and transport the shotcrete to an off-Site disposal area at a relatively high cost when it could be stabilized in place with an on-Site soil berm.

EPA Response: EPA has amended the remedy to include an engineering evaluation which will be performed during design to determine whether the shotcrete could be left in place, covered with clean fill, and re-vegetated. Also, if it is found that the shotcrete cannot be left in place, it may be disposed of on-Site.

4. We believe that removal of the dam and related drainage structures is not necessary. If the intent of the dam removal is to return the Site to its original condition, then the existing dam and structures certainly meet or exceed this intent. If liability is the issue, then Frederick County may be able to assist EPA in resolving this issue. Leaving the shotcrete and dam with associated drainage structures in their current condition would, not only save cost, but could lead to a more environmentally friendly closure plan.

EPA Response: As indicated previously in this Responsiveness Summary and elsewhere in this ROD, EPA has amended the remedy to include an engineering evaluation during design to determine whether the shotcrete could be left in place. EPA has also indicated that it may allow the dam to remain intact if, prior to the completion of remedial design, Frederick County or some other entity obtains possession of the dam and of the land the dam and pond are located on, and agrees to maintain the dam and pond. If such a change is made with respect to the dam, it will be in accordance with the procedures in the NCP.

5. After reviewing the cost estimates for Alternative RHP S-4, we take exception to the

following: the necessity to construct a concrete pad to dewater the sediment; explain why the sediment in the pond will be "dredged"; the cost for transport and disposal of the sediment is inflated; the cost for wetland restoration is beyond ridiculous.

EPA Response: The cost estimates developed in the Feasibility Study are conservative and, in accordance with EPA guidance, the cost estimates are in the range of -50% to + 30%. The purpose of the cost estimates in the Feasibility Study and the Proposed Plan is to make comparisons of each alternative's relative costs. More refined cost estimates will be developed as part of the remedial design, and the actual cost to complete the work will be the result of a competitively bid construction contract.

One reason to dewater the sediment is to reduce the total weight of the sediment which will, in turn, reduce the cost of disposal of the sediment since the disposal cost is based on weight. As indicated previously in this ROD, EPA is not certain at this time whether the sediment will require dewatering. If dewatering is required, we will evaluate using a bermed area with a synthetic liner, as indicated in the County's comments. However, a concrete pad was assumed in the Feasibility Study and Proposed Plan because it is more difficult to remove the dewatered sediment from a synthetic liner than it is from a concrete pad.

The term "dredge" is not meant to convey the type of construction equipment necessary to remove the sediment from the pond. In fact, a dredge line is not envisioned to perform this work.

The cost for disposal of the sediment is based on figures developed in 1998. The range of disposal costs found in the 1998 survey vary from $90 per ton to $125 per ton.

The amount allocated for restoration and creation of wetlands ($100,000) is an approximation and is not meant to delineate the type of work that will be done at the Site. Although EPA has coordinated with the U.S. Fish & Wildlife Service regarding the Proposed Plan, a wetlands delineation has not yet been completed. EPA does not have a determination from the U.S. Fish & Wildlife Service of whether wetlands exist at the Site and, if they do, what are the extent of the wetlands. The $100,000 figure used in the Feasibility Study is just an approximation.

6. Based on our comments, you can conclude that Frederick County does not support EPA's recommended "preferred" alternative to close out the Rhinehart Tire Fire Site. We firmly believe that the proposed alternative lacks sound engineering planning and simple logic. The plan's lack of attention to cost goes without saying.

   In order to salvage the dam and related structures, we recommend that EPA defer the proposed plan until such other time that other alternatives can be explored. Frederick County would welcome the opportunity to discuss other alternatives with EPA which may result in a more economical and environmentally friendly conclusion to the Rhinehart Tire Fire Site.

EPA Response: The alternatives in the Proposed Plan have not been developed to the level of detail that you would expect to see in a final design. Actual design of the remedy will not start until some time after the ROD is issued and a design contractor is procured. EPA believes that Frederick County's comments are based on a misconception of the level of detail that is usually contained in a Feasibility Study and Proposed Plan. As stated previously, EPA will evaluate many of the County's comments during the upcoming design phase. In addition, more refined cost estimates will also be developed during the design.

In regards to the County's preference of leaving the dam and related structures in place, EPA may leave the dam intact if the County or some other entity obtains possession of the dam and of the land the dam and the pond are located on, and agrees to maintain the dam and pond by the time the design is completed, so as not to delay the completion of the Site cleanup work. During the public comment period, EPA received a petition signed by 115 local residents in support of EPA's preferred alternative. This petition requested that EPA move quickly to complete the cleanup of this Site with no interference from the State or the County. A gentleman speaking on behalf of Mrs. Rhinehart expressed a desire that EPA complete whatever work is necessary in as short a time as possible. Thus, EPA cannot indefinitely defer a decision about the dam until other alternatives can be explored. If the County or some other entity obtains possession of the dam and the land the dam and the pond are located on, and agrees to maintain the dam and pond by the time EPA completes the design, EPA would consider leaving the dam intact. If EPA decides to revise the remedy to leave the dam in place, this decision would be implemented in accordance with the procedures contained in the NCP. If such arrangements cannot be put in place by the time EPA completes the design, EPA will move forward with removing the dam and its related structures.